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No. 5897 LONDON: SATURDAY, SEPTEMBER 5, 1936 CCXXXI

CONTENTS

THE WHOLE OF THE LITERARY MATTER IN THE LANCET IS COPYRIGHT

ADDRESSES AND ORIGINAL ARTICLES

Treatment of Angina Pectoris. By BASIL PARSONS-SMITH, F.R.C.P. 549
Choice of Patients, with Angina of Effort, for Thyroidectomy. By GEOFFREY BOURNE, F.R.C.P. 551
Carcinogenesis as a Means of Reducing Cancer Mortality. By SIGISMUND PELLER, M.D. 552
Impaired Glucose Tolerance in Certain Alimentary Disorders of Childhood: Treatment with Liver Extract. By C. W. ROSS, M.B.—(*With charts*)..... 556
Intravenous or Intraperitoneal Antitoxin Treatment, Combined with Short Isolation Period, in Scarlet Fever. By H. STANLEY BANKS, M.D., D.P.H. 559

CLINICAL AND LABORATORY NOTES

Congenital and Familial Absence of Hair from Whole Surface of Body. By Capt. MIN SEIN, M.R.C.P. 564
Extraction of Male Hormone from Urine for Biological Assay. By R. K. CALLOW, D.Phil... 565

REVIEWS AND NOTICES OF BOOKS

An Introduction to Psychological Medicine. By R. G. Gordon, F.R.C.P., N. G. Harris, M.D., and J. R. Rees, M.D. 574
Fractures. By Paul B. Magnuson, M.D. 574
Die Tuberkelbazillämie in ihrer Auswirkung auf die Gesamtmedizin. By Prof. Ernst Loewenstein..... 574
Foundation of Provincial Medical Education in England By E. M. Brockbank, F.R.C.P.... 575
Out of the Night. By Prof. H. J. Muller 575
British Journal of Children's Diseases 576

LEADING ARTICLES

INCIDENCE OF CANCER IN MAN 577
FLIES IN THE COUNTRYSIDE 578
SAFE CATGUT 579

ANNOTATIONS

National Collection of Type Cultures 580
World Requirements of Narcotics 580
Training for Psychiatry... 581
Clinical Records of Influenza..... 581
Crowns and Bridges..... 582
John Howard..... 582
Serum Treatment of Tuberculosis 583
Epidemic Encephalitis 583
Dangers of Thorium Dioxide..... 584
Defining the Specialist .. 584
The Onion Again..... 585
Abdominal Myomectomy.. 585
Colonial Medical Service... 585

PROGNOSIS

CXII.—Prognosis in Acute Osteomyelitis. By Prof. JOHN FRASER, F.R.C.S. 586

THE SERVICES

Royal Naval Medical Service—Royal Army Medical Corps—Royal Air Force—Indian Medical Service..... 588

NEW INVENTIONS

A New Colostomy Outfit. By JOHN I. F. KNIGHT, M.R.C.S.—(*Illustrated*).. 576

SPECIAL ARTICLES

Enteric Fever in Milk-borne and Water-borne Epidemics: A Comparison of Age- and Sex-incidence. By A. BRADFORD HILL, D.Sc., and K. MITRA, M.B., D.P.H. 589
British Medical Association: Section of Pathology and Bacteriology: Disorders of Hæmopoiesis due to Toxic Substances..... 566
Section of Physical Medicine: Ultra-high Frequency—Mild Radium Therapy 568
Exhibition by Combined Sections: Origins of Movements in the Fœtus—Embryology—Experimental Physiology—Nutrition 570
Section of Public Medicine: Shellfish and the Public Health 572
Units of Sex Hormones: Animal Units and their Evolution—International Units..... 595
Medicine and the Law: Prosecution for Alleged Conspiracy to Sterilise.. 596
Paris: Sociological Study of the Juvenile Vagrant—Death of M. Robert Charlet 596
Budapest: A Typhoid Epidemic 597

GRAINS AND SCRUPLES

From a Doctor without Patients 598

PUBLIC HEALTH

Enteric Fever Outbreak in the Bournemouth Area 603
Infectious Disease in England and Wales 603

OBITUARY

Henry Hardacre Irving Hitchon, M.R.C.S. 603
John Wilson Moir Jamieson, M.B..... 603

CORRESPONDENCE

Appointments in Clinical Science (Prof. E. Mellanby, F.R.S.) 600
Medicine and Peace (Dr. R. Coope) 600
Fixed Dental Appliances (Mr. J. H. Oliver, L.D.S.) 601
"Manners Must Adorn Knowledge . . ." (Dr. R. Passmore) 602
Wheat-germ Oil (Mr. R. T. M. Haines) 602
The London Clinic (Mr. N. W. Lewis) 602
A Vigorous Veteran (Sir George Turner, F.R.C.S.) 602

MEDICAL NEWS

University of Cambridge .. 604
Society of Apothecaries .. 604
North Devon Infirmary, Barnstaple 559
Fellowship of Medicine .. 573
Royal Gwent Hospital 599
All-electric Hospitals at Glasgow 602
Manchester Royal Infirmary 603
British Red Cross Society 604
St. George's Hospital 604
Post-graduate Courses in Berlin 604
The late Dr. John Donnan 604
Emigration of German Jewish Doctors 605

NOTES, COMMENTS, AND ABSTRACTS

Medical and Veterinary Collaboration 606
"Help Sought" (Dr. E. C. Warner, Dr. C. T. Norris) 607
Festschrift for Dr. Emil Barell 607
Holidays for Working Women 608
A Medical Survey in Papua 608
New Preparations: Tannaflavine Jelly — Dmelcos Diagnostic Vaccine — Veracolate — Vigoreat Crispbread 608

Medical Diary 604
Births, Marriages, Deaths 604
Appointments 605
Vacancies 605

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For practical purposes angina pectoris may be regarded as a symptom-complex characterised by paroxysmal attacks of substernal pain, constrictive in type. It is more often than not induced by muscular effort, exposure to cold or mental excitement and, in its severer forms, is associated with varying degrees of circulatory collapse. The treatment of angina pectoris in all its forms is primarily dependent on accurate diagnosis and this we must be prepared to establish by consideration of the patient's subjective symptoms. It is generally admitted that no single or specific pathology is concerned in the condition, and that in a considerable number, probably 25 per cent. of all cases, the cardiovascular examination is negative to the most careful examination. The patient's history, in other words, is of paramount importance, and by careful inquiry it is possible to assemble a convincing picture of the condition which, in point of fact, is essentially similar in its modern conception to that originally described by Heberden in 1768, whose classical and comprehensive description of angina pectoris has been accepted to date without qualification.

Medical Treatment

Although a large number of conflicting theories have been, from time to time, propounded in explanation of the anginal syndrome, it is unnecessary here to make other than a brief statement about the causes that are nowadays generally approved of and which, incidentally, merit ample consideration when one approaches the question of treatment. From the pathological aspect two lesions, coronary sclerosis and myocardial fibrosis, are especially noteworthy, and these in combination induce relative or absolute ischæmia of the heart-muscle and defective removal of waste products. The result is to stimulate the afferent pain fibres in the plexus of nerves surrounding the affected vessels. This being the acknowledged mechanism of anginal pain one can readily appreciate that its treatment must inevitably present very material difficulty, for in the large majority of cases the cardiac disability is not only irremedial but also progressive.

Regimen.—Prevention of attacks will clearly be an essential consideration in the routine programme of all patients suffering from anginal symptoms. As far as possible they must be made to appreciate the significance of their affection, that their circulatory reserve is to some extent diminished, and that they must be prepared to adopt restrictions in their mode of life, avoiding more particularly all factors that they may have found by experience to produce painful seizures. Under certain circumstances—i.e., if the attacks are becoming increasingly frequent and if they occur when the patient is resting, also if there is any suggestion of coronary thrombosis—it will be necessary for the patient to undergo a period of complete rest. Otherwise, an average case should be encouraged to continue those of his habits and activities that do not tend to precipitate his attacks, always assuming that he makes such rearrangements in his mode of life as will exclude excessive physical strain, prolonged exertion, exposure to weather extremes and, as far as possible, mental stress. In all cases it will be necessary to emphasise the value of adequate relaxation, and, should there be any question of overstrain, either physical or mental, it may be advisable to prescribe a quiet, restful holiday or a carefully planned sea voyage. Certain directions about the diet should be laid down as an integral item of the general treatment and, since digestive errors frequently complicate the angina syndrome, they should be as far as possible relieved on orthodox lines. All patients should be cautioned that they must take plain, easily digestible food, that they must eat slowly, and that they must make a practice of resting quietly for at least half an hour after meals. A further detail concerns the question of smoking, and, although opinion is by no means unanimous, it would be generally admitted that strict moderation should be observed and preferably total abstinence.

Drugs.—A large number of drugs have been recommended from time to time but, with certain exceptions, they have failed to establish their value. Potassium iodide has a well-recognised reputation in the treatment of arterio-sclerosis, and it is fair to assume that it may stay the progress of coronary disease, but the general consensus of opinion nowadays is to associate successful iodide therapy in angina cases with pre-existing syphilis. Further remedies which may be prescribed with some degree of confidence, in that they exert a dilating effect on the coronary vessels quite apart from their eliminatory value, are the xanthine series of drugs. These include Diuretin (grs. 10–15) best prescribed in tablet form; theocalcine (grs. 10–15); theophylline (grs. 5); Euphyllin (0·1 g.); Theamin (0·1–0·2 g.); and Theominal (grs. 5). All these preparations have established reputations in the treatment of patients suffering from angina. They are relatively non-toxic and their prescription is otherwise justified in that they exert no ill-effects on the kidney structure. If nervous symptoms are prominent, as after excessive mental strain, and if insomnia is an obvious factor, short courses of a mild sedative, such as Luminal or bromide or chloral hydrate, are definitely helpful, and as a general rule one should encourage all angina cases to take full advantage of the nitrite preparations, a convenient form of the latter being the nitroglycerin tablets (gr. 1/100) which may be used prophylactically should an attack of pain be expected or actually threaten to develop.

The further indications for drug treatment in angina pectoris concern more particularly certain of the associated conditions which may complicate the issue. These include obesity, syphilis, and hypertension, each of which will require appropriate consideration.

Obesity is always considered to be a serious complication in patients with cardiac affections, and it should be counteracted as far as possible in appropriate and energetic fashion. In an average case the weight should be reduced by roughly a pound a week. This can usually be achieved by moderate restrictions in the fat and carbohydrate intake; by occasional fast days, say once weekly, on which the diet is limited to tea, milk, gravy, and fruit juice; by suitable exercise and such schemes of physiotherapy (including massage, baths, colonic lavage, diathermy, &c.) as the various spas nowadays provide; and lastly by the prescription of thyroid extract if the metabolic rate is found to be subnormal.

In *syphilis* energetic specific treatment should be instituted without delay. First, a two-months' course of

potassium iodide with mercury, these drugs being combined in a mixture:—

Pot. iod. grs. 10.
Liq. hydrarg. perchlor. ʒi.
Spir. chlorof. ℥ 10.
Inf. gent. co. ʒi.
Sig. ʒi., t.d.s., p.c.

Alternatively it may be preferable to prescribe mercury in the form of a pill (hyd. c. cret and pulv. ipecac. co. āā gr. 1) or by inunction (ung. hydrarg., ʒi.) or by intramuscular injection (mercury, gr. 1, either in the form of gray oil or mercury cream). After the course of iodide and mercury, and assuming that the physical signs do not indicate extensive disease in the myocardium or the aorta, it will be advisable to proceed with arsenical preparations—novarsenobillon or sulpharsphenamine—in minimal doses (0·15 g. weekly) to begin with, which may be increased very gradually, according to the patient's tolerance, to a maximum of 0·45 or 0·6 g., the full course extending over approximately 12 weeks. Certain patients, however, are unable to tolerate arsenic in any form and, bismuth may be substituted, a suitable preparation of which—Bismostab—may be prescribed, 12 doses (0·2 g. intramuscularly) at weekly intervals. According to the patient's progress the above courses may need to be repeated over periods varying from one to two or more years, and it is generally felt that the results amply justify such a line of treatment.

Hypertension is an outstanding feature of the anginal state in a considerable number of patients, and the preventive regimen outlined above is equally applicable to this condition. In addition it should be ensured that the patient has efficient elimination by all the natural routes. He should be encouraged to take occasional courses of treatment at some suitable spa such as Harrogate, Bath, Vichy, Royat, Aix-les-Bains, or Nauheim. If symptoms of plethora, headache, mental confusion, tinnitus, palpitation, &c., are especially troublesome he should be subjected from time to time—say at three-monthly intervals—to moderate venesections (12–20 oz.).

For the actual attack of angina it is customary to prescribe the nitrites in some form—a tablet of nitroglycerin (gr. 1/200–1/50) or an amyl nitrite capsule (℥ 3–5), the latter being more especially valuable for the seizures of true spasmodic angina, especially if the blood pressure happens to be raised. When there is flatulence and indigestion a simple carminative draught is indicated, either peppermint or brandy in hot water, or a medium dose (℥ 20–30) of tinct. camph. co., or a mixture of sodium bicarbonate (grs. 15) with sal volatile (℥ 15) in chloroform water (ʒi.). These failing, more urgent remedies may be adopted, including a mustard plaster or hot bottles over the precordium, an inhalation of chloroform, a hypodermic injection of morphia (gr. ¼–½), and oxygen inhalations if cyanosis happens to be a marked feature.

Surgery

The above is a synopsis of the treatment of angina by strictly medical remedies and we may now review the surgical aspects of the problem which have been developing gradually during the past few years. These include cervical sympathectomy, paravertebral injections of alcohol into the upper dorsal roots, and thyroidectomy.

SYMPATHECTOMY

The operation for cervical sympathectomy was first proposed by Francois Frank in 1899, and later (1916) introduced by Jonnesco. Since his time a large variety of modifications have been suggested, the extent of the operation varying in the hands of different surgeons from a simple transection of the left sympathetic trunk between the superior and middle ganglia to the complete removal of the sympathetic nerves on both sides, including the superior, middle, and stellate ganglia. Apart from the fact that troublesome complications may follow cervical sympathectomy, the operation has not been adopted to any great extent in this country by reason of the uncertainty of its results. It should nevertheless be remembered that it is a rational proceeding in the hands of a competent surgeon for an otherwise intractable case of angina.

ALCOHOL INJECTION

The paravertebral injection of 85 per cent. alcohol into the upper five or six dorsal roots aims at the destruction of the sympathetic nerve connexions; the operative technique is difficult and although in my experience results have been somewhat disappointing, others have had more encouraging experience and, as a method of relief in cases which fail to respond to the usual therapy, the injection treatment is certainly worthy of consideration.

THYROIDECTOMY

In the treatment of angina pectoris thyroidectomy is a relatively modern conception which has been gradually evolved by accurate clinical investigation and which may nowadays be recognised to have a definitely sound foundation; outstanding historical details in the history of its application to heart cases include the following: (1) The report of Kocher's cases in some of which the disappearance of heart failure following thyroidectomy was described.[7] (2) The observations of Hamilton on the result of thyroidectomy in patients with hyperthyroidism and cardiac failure.[5] (3) The clinical studies by Blumgart and Levine,[3] who associated the improvement in thyrotoxic patients suffering from heart failure with the induction of a lowered metabolic rate following thyroidectomy, and suggested that cardiac patients with a normal metabolism might show improvement if it were artificially lowered, the demands of the tissues being reduced to the extent of rendering an adequate adjustment for the slowed circulation. (4) The further observation by Blumgart and his colleagues that patients suffering from myxœdema, in whom the metabolic rate is subnormal and the velocity of the blood stream is materially slowed, show no signs of circulatory incompetence, the lowered speed of the blood flow being adequate for the reduced demands of the tissue metabolism.

These being the material facts, one can readily appreciate the potential value of thyroidectomy in patients suffering from anginal symptoms. The condition is expressive of defective circulation in diseased coronary vessels, of myocardial ischæmia secondary thereto, and consequently of a discrepancy in the supply of the tissue demands. Under these circumstances it is conceivable that a reduction in the metabolic rate might indirectly compensate for the inadequate state of the coronary circulation by lowering the range of the tissue requirements to a level more compatible with the impaired blood-supply, and incidently also by implementing a definite reduction in the amount of work which the heart is called upon to perform.

The value of thyroidectomy in the treatment of intractable cases of angina pectoris can best be assessed by reference to the actual results obtained following the operation. Blumgart and his co-workers [4] have published a series of 31 cases of total thyroidectomy for angina pectoris, the analysis of which can be summarised briefly as follows:—

Of the cases 12 recovered sufficiently to be able to return to work, which was impossible before operation, 7 of these remaining free from attacks for periods ranging

over 3–18 months; 5 cases were relieved for periods of 3–9 months before the attacks recurred.

Pain was relieved in 3 cases, their activity continuing to be restricted by reason of myocardial failure. Of the remaining 11 cases, 5 were materially better following the operation and 3 died.

A further series of 23 cases was reported by Levine and Eppinger,[8] the analysis of their results being as follows:—

Excellent in 8 cases, good in 6, moderately good in 4, fair in 1; and 4 fatal cases, 2 following the operation and 2 from coronary thrombosis at a later date.

It would be unwise at the present time to attempt any final assessment of the significance of these results, and, although one cannot fail to be impressed by the beneficial effects which followed extirpation of the thyroid gland in certain of the above-mentioned cases, it is nevertheless obvious that this method of treatment is, as yet, in the experimental stage. Final decisions on the efficacy of this operation for the relief of angina must be deferred pending further clinical investigations.

COLLATERAL CIRCULATION

In concluding the surgical aspect of the therapy of angina, special mention should be made of recent work in regard to the value of grafting operations for coronary disease—in other words the provision of a collateral vascular bed for the myocardium when the efficiency of its natural circulation is prejudiced by progressive circulatory incompetence. The pioneer work of Beck, Tichy, Hudson, Moritz, Wearn, and Leriche is worthy of very special note; Beck and Tichy[2] recognised three main sources of blood-supply to the myocardium: (1) the coronary vessels, (2) the thebesian vessels,[10] and (3) the extracardiac anastomoses between the coronary system and other branches of the aorta in the fatty tissues at the base of the heart.[6] They commented on the case recorded by Thorel of a patient with complete obliteration of both coronary arteries in whom the blood-supply to the heart was maintained by vascular adhesions from the pericardium and, experimenting on dogs, they contrived an operation to produce a collateral vascular bed for the heart, using for this purpose the parietal pericardium, the pericardial fat, and the mediastinal tissues. Their investigations led to the following conclusions: (1) Almost total occlusion of both coronary arteries was compatible with life if the heart had been previously provided with a collateral vascular bed. (2) The stimulus that was required to bring about continuity between the extracardiac and the cardiac beds was a reduced pressure in the major coronary vessels, which they ingeniously effected by the use of periosteal bands or silver clips. These results led finally to trial of the operation on human beings, the first recorded example[1] being that of a man, aged 48, who had 9 years' history of angina pectoris. A pedicle graft of the left pectoralis major, including the internal mammary artery, was sutured to the inner surface of the parietal pericardium; this and the epicardium were roughened with a burr, and the medial edge of the pectoralis muscle was attached to the outer surface of the parietal pericardium. The patient was entirely free from pain and able for light work 3½ months after the operation; 3 months later he was in regular employment as a gardener and regarded himself as cured. Subsequently 5 other patients were subjected to a similar operation, the result being excellent in 1, fairly satisfactory in another, and as yet undetermined in the remaining 3.

A further series of animal experiments has been recorded by L. O'Shaughnessy,[9] who applied pedicle grafts of omentum to the myocardium following preliminary myocardial infarction. Improvement in the exercise tolerance suggested that the grafts were efficient, and at autopsy injections of dye confirmed the existence of vascular channels from the grafts to the myocardium.

One may summarise these researches by noting that certain operations have recently been devised with a view to revascularisation of the myocardium by grafts for the relief of myocardial ischæmia. These operations must be submitted to further experimental investigation before their value in the treatment and prophylaxis of angina pectoris can be adequately assessed.

REFERENCES

1. Beck, C. S.: Ann. of Surg., 1935, xxxii., 801.
2. Beck, C. S., and Tichy, V. L.: Amer. Heart Jour., 1935, x., 849.
3. Blumgart, H. L., Levine, S. A., and Berlin, D. D.: Arch. Internal Med., 1933, li., 866.
4. Blumgart, H. L., Riseman, J. E. F., Davis, D., and Weinstein, A. A.: Amer. Heart Jour., 1935, x., 596.
5. Hamilton, B. E.: Boston Med. and Surg. Jour., 1922, clxxxvi., 216.
6. Hudson, C. L., Moritz, A. R., and Wearn, J. T.: Jour. Exper. Med., 1932, vol. lvi.,
7. Kocher, A.: Mitt. a. d. Grenzgeb. d. Med. u. Chir., 1902, i., 1.
8. Levine, S. A., and Eppinger, E. C.: Amer. Heart Jour., 1935, x., 736.
9. O'Shaughnessy, L.: Brit. Jour. Surg., January, 1936, p. 665.
10. Wearn, J. T.: Jour. Exper. Med., 1928, xlvii., 293.

CHOICE OF PATIENTS, WITH ANGINA OF EFFORT, FOR THYROIDECTOMY

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In considering treating patients with cardiac pain by thyroidectomy one of the first essentials is that the patient should have a reasonably healthy myocardium. This is desirable from two points of view: first, that the patient may survive the operation; and, secondly, that a reasonable spell of post-operative health may follow. The case here described proves how difficult the evaluation of the state of the myocardium may be in these patients.

CASE RECORD

A man, aged 58, came under my care complaining of precordial pain.

History of the present condition.—Four years previously he had suffered from a sudden very severe attack of precordial pain at night. This persisted for three or four days, during which period it slowly subsided. He was forced to remain in bed. Following this attack of coronary thrombosis he suffered from considerable shortness of breath on exertion, but slowly made a complete clinical recovery. He continued his work as a motor engineer for 18 months without pain. At the end of this period he began to suffer from pain, which was localised to the precordium. This pain was substernal and produced by exercise. It was proportional to exertion and disappeared on resting. It was relieved by nitroglycerin tablets. At the time of the examination he stated that the slightest exertion would produce pain, and that this pain for the past two months had extended down both arms. For the previous two weeks he might get it even at rest, especially if he were lying flat upon his back. He suffered from no shortness of breath while remaining still.

Past History.—There was no history of any previous disease. Habits: 6–7 cigarettes a day.

On clinical examination there was no shortness of breath, orthopnœa, cyanosis, pallor, or excessive pulsation. The

pulse-rate was 80 and the rhythm regular. Some premature ventricular beats were present. The blood pressure was 144/82. Examination of the retinæ showed no marked vascular change. Heart: the apex-beat was 5 in. to the left in the fifth space, and on auscultation a slight systolic murmur was audible at the apex; this was not conducted. The aortic second sound was somewhat accentuated. The liver was palpable one inch below the costal margin in the right nipple line. It was considered that the patient had suffered from some degree of myocardial degeneration, secondary to coronary disease, and that the symptoms dated from an attack of coronary thrombosis, since when angina of effort had been present. It was also thought that the central nervous system was unduly sensitive. In view of these considerations, taking into account that the pain was exceedingly severe, was definitely of an organic nature, and was not associated with hyperpiesis or any evidence of severe cardiac disease, it was decided that he might be a suitable case for total thyroidectomy. Further investigations were therefore done.

Electrocardiography showed a slight degree of left-side preponderance and some flattening of the T-waves in all leads, and the Q R S measured 0·09. The Wassermann reaction was negative. X ray of the heart showed no disproportion of the transverse diameter of the heart compared with that of the chest. There was no evidence of cardiac enlargement. The contour of the heart shadow was within normal limits. The heart-chest ratio was 0·5. The basal metabolic rate, which was done as a pre-operative measure, was 4 per cent. The patient was transferred to the care of Prof. Paterson Ross.

Shortly after being transferred to the surgical ward the patient sat up in bed and fell back dead.

The following is the *post-mortem* note: "Rigor mortis and hypostasis present. Larynx and trachea, a few petechiæ. Pleura, thickened over a small area at either apex. Lungs emphysematous. Mediastinal glands normal. Peritoneum natural. Alimentary tract natural. Liver and pancreas natural. Spleen slightly enlarged, follicles present. Kidneys: capsule strips easily, irregular granular surface, cortex slightly reduced. Perinephric fat increased. Veins not prominent. Right pelvis contains some turbid urine and its mucosa is a little congested. Bladder natural. Prostate slightly enlarged. Thyroid slightly enlarged and some increase in colloid. Suprarenals natural. *Special examination:* Pericardium, no excess of fluid. There is a fibrotic area present over the posterior surface of the left ventricle. All chambers somewhat dilated. Tricuspid valve admits four fingers, mitral orifice three fingers. Atheroma is present on the anterior cusp of the mitral valve and on the corresponding aortic cusp. The endocardial surface of the posterior wall of the left ventricle, behind the posterior cusp of the mitral valve, shows a circular fibrous scar, 4 cm. in diameter. The heart muscle is flabby and contains patchy areas of fibrosis. The coronary arteries show slight atheroma around the mouths. An advanced degree of atheroma and calcification is present along the course of both vessels, so that the lumen of both is almost obliterated in places. No recent thrombosis is present. The aorta shows the presence of gross atheroma, with much calcification, especially in the abdominal part."

CONCLUSION

It is impossible in some cases to deduce the state of the myocardium from clinical examination of the heart alone. The electrocardiogram may show only a slight degree of abnormality in the presence of severe myocardial change. Radiographic examination of the heart may reveal no severe abnormality and yet advanced myocardial change may be present. The conclusion to be drawn is that in the absence of an exercise-tolerance test it is impossible in some cases to estimate the severity of ventricular disease resulting from coronary atheroma. In most patients suffering from angina of effort there are periods of comparative freedom from symptoms, and it is upon these that the attention of the physician should be directed. It is necessary to inquire the distance which a patient can walk during these intervals, and whether shortness of breath is present. Furthermore, whether during the intervals of freedom from pain the patient can climb stairs or slight hills without undue shortness of breath.

CARCINOGENESIS AS A MEANS OF REDUCING CANCER MORTALITY

By Sigismund Peller, M.D. Vienna

The three main points at issue in the present fight against cancer are: (1) early recognition and treatment of the neoplasm itself; (2) treatment of the precancerous conditions; and (3) diminution of carcinogenic irritants. These three points are based on the theory that cancer is at first a localised, and later a metastatic affection. The results of the campaign, however, have hitherto been unsatisfactory. It should therefore be the first task of cancer research to find out the reasons for this failure and if possible to discover new practical measures of combating the disease.

EFFECTS OF TREATMENT ON MORTALITY

As the risk of developing cancer depends mainly on the age of the patients, statistics are of no value that study only the changes in incidence without taking enough account of the changes in the average age of the population. Until recently (Bashford, de Bovis, Gherardi) it was an exception for this to be considered, and false conclusions have been drawn from annual statistics which show a rise everywhere in deaths from cancer.

If we bear in mind that from year to year an ever-increasing number reach the "cancer age," whereas those between childhood and adolescence are relatively decreasing, it is easy to understand that, despite the rise in the death-rate from cancer, the *risk* of people aged 30–70 dying from cancer has not increased in the last decades; on the contrary, it has decreased. I first proved this [1] in 1925 for London, for England as a whole, and for Vienna; later support came [2-5] from several towns in Germany, Denmark, and Switzerland. For those above the age of 70, however, it has not been possible to prove this decrease, because here the uncertain diagnosis of "old age," which formerly was often made, tends to be replaced more and more by the diagnosis of cancer. The mortality, also, among middle-aged persons in England has not decreased during the past few years; indeed, it shows a slight increase,[6] but whether this is only a passing phase or the beginning of a rise of the secular cancer curve cannot yet be decided.

This fall in the cancer mortality, which has been observed for the last quarter of a century, is not the result of therapy. If it were, the individual organs would have participated in this diminution in proportion to their accessibility to treatment. In the statistics of the causes of death, cancer of the skin and of the lips, for example, should have decreased the most, of the female genital organs and mammary gland much less, and of the œsophagus and stomach least of all. This however is not so. According to studies carried out in Zürich, Dresden, and Berlin, the mortality from cancer of the stomach and œsophagus is a great deal less, whereas in skin cancer it has remained almost stationary and in the breast it has even risen. From the English statistics, also, no connexion can be traced between the changes in

the mortality of cancer in an individual organ and its chances of being successfully treated. We must therefore conclude that certain factors besides successful therapy have deeply influenced the real changes in incidence, in mortality, and in the distribution of the sites of the primary tumours.

CAUSES OF FAILURE IN TREATMENT

It is not known what proportion of cancer arises from circumscribed precancerous conditions, such as leukoplakia, scars, and chronic inflammation. According to Hinselmann's observations it seems that cancer of the cervix passes through a period of several years of lesser activity in leukoplakia before it becomes visible to the naked eye. This, after all, is not surprising; we know that metastases may remain hidden in one place for weeks, months, and even years before they become clinically demonstrable. The rate of growth of a metastasis in its late stages may differ entirely from that when it began. Why should this not be so with primary tumours? It would mean that even though early treatment in the clinical sense were instituted, really early or histologically "young" cancers would not be operated on more often than they are at present. This will be true at least as long as early diagnosis is dependent on the present methods of work. The purely histological early signs are recognised only in those cancers that are in sites clinically apparent and easily accessible. But in the remainder—and they constitute the overwhelming majority—we cannot recognise this early stage with the means now at our disposal.

If we say that patients must come a few weeks or months earlier for treatment in order to achieve better results, we must believe in a very simple relation between the clinical appearance of the neoplasm and its real stage of development. In different organs tumours grow at very different rates before they are subjectively or clinically obvious or have become inoperable. According to Carter [7] the average size of the tumour from which metastases and effects on the general system become noticeable varies with the organ attacked. At the Mayo Clinic the following measurements of primary tumours were made:

	(A) Smallest (mm.).	(B) Average (mm.).	Ratio A/B.
Colon	9	64	1/7
Stomach ..	5	61	1/12
Breast	2	32	1/16

But in one and the same organ the rate of growth, destruction, recurrence, and metastasis may vary considerably, even when the tumours are histologically alike (Borst). The rate of growth, stage of development, and duration do not run parallel. It is probably a mistake to conclude that different results are obtained by operations or other therapeutic measures merely because those cases of microscopically diagnosed carcinoma of, say, the breast or cervix that were successfully treated were seen early and the failures were seen too late, and to apply this explanation to all the other types of carcinoma. It is improbable that in, for example, cancer of the lung the percentage of permanent cures (which at present is less than 2 per cent. [8]) would be substantially increased by earlier diagnosis. We are therefore compelled to study the question of cancer more objectively and with the utmost thoroughness in order to determine whether our frequent failures may not be due to our own misconception of the fundamental nature of cancer rather than to our patients' varying behaviour in presenting themselves for diagnosis or treatment.

RELATION BETWEEN INTENSITY OF IRRITATION AND INCIDENCE OF CANCER

If the theory of local origin is accepted, it follows that the number of tumours formed at a given site is directly proportionate to the amount of irritation. On the basis of this theory it would be simply arbitrary to classify all cancers under one head. The theory is therefore scientifically sterile, for the incidence of the primary tumour in a particular organ is absolutely independent of that in other organs. Accepting this theory, it is even impossible to classify under one heading, say, cancer of the cervix and cancer of the body of the uterus, to say nothing of the cancers of all the organs; this was clearly expressed by von Franque,[9] the German gynæcologist. That is to say if one or several organs received more irritation without changing the amount of irritation in the other organs, the incidence of tumours in these other organs will be unchanged. This conclusion seems, on the grounds of the theory, so natural that up to the present no one who believed in it felt the necessity of verifying it. This would not be easy, as the intensity of carcinogenic irritation in daily life cannot be estimated and measured, though there are a few exceptions, for example, the amount of work in certain occupational cancers and the number of pregnancies in genital cancer.

Occupational cancer.—Here there is the difficulty that the irritants act not only on a certain organ—e.g., tar on the skin and alcohol on the mouth, œsophagus, stomach, or liver—but also, to a lesser degree, on the other organs. Therefore an increased frequency of cancer in these organs does not contradict the theory of local origin, but it would if in consequence of the increase of cancer in the irritated organs there were a decrease in the non-irritated organs, compared with the average in the same social class. The occupational mortality statistics [10] for England and Wales in 1921–23 seem to offer this contradiction. In the four alcohol trades (barmen, cellarmen, waiters, and brewers) the mortality of skin and lip cancer is extremely low. In the average of the social classes * III., IV., and V. respectively 6·4, 9·5, and 12·5 per 100,000 died of cancer of the skin and lips; in the specially predisposed alcohol occupations the figure is only 2·3 per 100,000. This big discrepancy can in small part be accounted for by the different age-distribution. If the alcohol occupations had the same age-distribution as the social classes II., III., and IV., then the mortality

TABLE I.—*Cancer and Alcohol*

Site.	Cancer mortality per 100,000.		
	Social class—		Alcohol trades at age-distribution of social class IV.
	IV.	V.	
Skin	6·3 } 9·5	8·6 } 12·5	3·7 } 3·7*
Lip	3·2	3·9	Nil
Tongue	8·1	16·8	21·0
Œsophagus ..	9·4	17·0	40·8
Stomach ..	36·3	50·3	48·3
Other sites ..	89·7	122·0	148·3
Total ..	153	219	262

* All these cases were over 70.

* The Registrar-General's Decennial Supplement, 1921. Social classes: I., upper and middle classes; II., intermediate; III., skilled workers; IV., intermediate; V., unskilled workers.

of skin and lip cancer would be respectively 3·8, 3·7, and 4·0 per 100,000. Among all workers in the alcohol occupations up to the age of 70 there was not a death from skin and lip cancer (Table I.).

In the occupations where tar or tar products are employed we also find organs with a diminished cancer incidence. In the official commentary on the statistics the raised incidence in the larynx, digestive organs, and "other sites" is mentioned, but no comment is passed on the sites with a lowered incidence; my own calculations on the basis of the official statistics revealed a lower incidence of cancer of the lip, tongue, and œsophagus (Table II.). Whether the statistics, which embrace all male deaths for the whole of England during 1921–23, show definite correlations cannot be decided. Apparently the figures show a contrast between cancer of the skin and lip on the one hand, and of tongue and œsophagus on the other.

TABLE II.—*Cancer and Tar Products*

Site.	Cancer mortality per 100,000 in cotton spinners and piecers, gas-stokers, and chimney-sweeps at age-distribution of social classes—	
	IV.	V.
Skin	53·8	62·8
Lip	1·9	2·3
Tongue	9·7	11·3
Œsophagus ..	7·6	9·0
Stomach ..	46·6	57·1
Other sites ..	135·1	159·2
Total ..	255	302

We find the same contrast also in the ten occupations with the lowest cancer mortality. In those skin cancer is more frequent than in the other members of the same social class; the mortality of lip cancer is also partly increased (Table III.).

TABLE III

Site.	Cancer mortality per 100,000.			
	Social class I.	Ministers and bank officials at age-distribution of class I.	Social class III.	Machine compositors, leather goods makers, stone miners, railway signalmen, photographers, grain millers, and farm bailiffs at age-distribution of class III.
Skin ..	3·1	4·2	5·3	7·5
Lip	0·6	0·4	1·1	2·7
Tongue Œsophagus Stomach	51·9	41·0	52·9	42·5
Other sites ..	149·7	114·7	94·8	79·0
Total ..	205	160	154	132

If members of these ten groups are exposed to more carcinogenic irritation of the skin than the average of the same social class, then the raised death-rate of skin cancer could be explained according to the theory of local origin. As far as I can see, this is not so; and we have therefore another fact that is incompatible with this theory. These facts can be observed still more clearly in another field—i.e., in the relation between number of births and cancer of the various parts of the body.

PREGNANCY AND CANCER

According to Virchow's theory of irritation it is assumed that as cancer of the cervix increases directly with the number of births that the total cancer incidence is also raised, but this is not correct. I have been able to show [11] that the increase of cervical cancer does not run parallel with the number of births. We see a great rise when we compare nulliparæ with women who have given birth even to only one or two children. But when we compare women who have had one or two pregnancies with those with three to seven, there is little change in the incidence. With the increase of cancer of the cervix due to pregnancy there is a decrease of cancer of the body, ovary, and breast, and this decrease is greater than the increase of cancer of the cervix. That is to say, that pregnancy leads to a fall in the incidence of certain cancers, but this is approximately balanced by an increase of cancer in the digestive organs.[12] The effect of pregnancy and birth is therefore mainly to transpose the primary tumours [1] and not to change the total incidence. Only in women who have been through many (more than eight) pregnancies is the total cancer incidence raised. It remains to be proved whether this is to be explained by the increased number of pregnancies, or by other factors that are usually allied with frequent pregnancies—e.g., social position. We must remember that in nulliparæ the distribution of the sites depends to a great extent on whether the patient is married or single—i.e., on what has caused these women to pass through the childbearing age as nulligravidæ.

All this shows, firstly, that the incidence in one organ, or part of an organ, does not depend only on the processes which go on in the organ itself, and, secondly, that for the increased incidence in the irritated organ, or part of the organ, there is a corresponding decrease in the other organs. Both points are incompatible with the theory of local origin. They are in accordance with the conclusions of Cramer,[13] who says "an increase in the incidence in one particular organ due to a direct effect is associated with a diminished incidence in other sites of such an order that the total incidence for the two populations remains the same." But I doubt whether this is a general "statistical law of cancer." The above-mentioned figures of the total cancer incidence in different social groups and occupations in England show not only differences in the site incidence but also considerable differences in the total cancer mortality and morbidity. We must also remember that in the last decades there have been considerable changes in the total cancer incidence. The susceptibles not yet affected are an important factor, as well as the intensity of the carcinogenic irritants—especially of certain types—and it probably depends on whether both the total and the site incidence are changed. Another point to be considered is whether what seems to be a change in the total incidence may really be only an acceleration or retardation of cancer manifestations. Our knowledge is unfortunately very deficient on this, as cancer research makes use of laboratory and animal experiments principally as a basis for investigation, and these are of no value for the problems cited.

INCREASE OF EXTERNAL IRRITATION AS A POSSIBLE AID IN COMBATING CANCER

Whenever irritation is considered as a cause of cancer every endeavour is made to diminish or to remove it. But if we accept it as a working hypo-

thesis that cancer is *from its very beginning a general disease with monolocal primary manifestations*, and if we remember at the same time that the importance of irritation lies in its action as a selective factor in fixing the site of the primary lesion, then we have to take into account in the cancer campaign of the future either a systematic artificial decrease in the susceptibility of certain organs or a systematic artificial increase of the irritation. Cramer has carried out experiments for some years with the first method, and the work of Maisin and of Watson may be mentioned, but the second will probably prove the more successful.

Applying, say, photochemical irritation to a part of the skin that is cosmetically and functionally unimportant, with just enough intensity to provoke skin cancer, the effect would be an increase of the disease at an earlier age and a corresponding decrease in other organs. The importance of sunlight as a carcinogenic factor is known clinically and has been proved in animal experiments.[16] To produce skin cancer in this way is therefore no problem, and it is easier to cure, less malignant, and slower in its development than cancer in other sites. The result would be that whilst the total cancer *morbidity*-rate would remain unchanged, or even be slightly increased, there would be a considerable decrease in the *mortality*. In order not to raise the incidence of all cancers by the increase of skin irritants, it would be necessary at the same time to enhance the susceptibility of the skin. Extracts from the tonsil will probably be found helpful for this, for Rubinstein and I have shown that giving tonsil extracts will increase the skin reaction to ultra-violet rays[17] (erythema and pigmentation). Perhaps it will be possible in the future to use other endocrine functions of this strange gland. In studies on over 30,000 young people I was able to show the important regulating effect of the tonsils on the normal general growth of the body,[15] and this may also be applied to pathological growths—i.e., tonsil extracts may also be helpful in retarding the growth of the neoplasms.

From clinical observation we know that skin cancer responds well to treatment, the methods of which have considerably improved in the last decade; and yet the mortality from skin cancer has only slightly changed, and in some parts has even increased. These two contradictory facts can only be explained by the conclusion that the morbidity of skin cancer has much increased, though unfortunately we have no statistics of cancer morbidity. Probably this increase of morbidity has been caused by the increasing habit of exposing the skin to the sun and to other irritants. The researches of Roffo in Buenos Aires[16] and my own studies in Palestine[17] seem to prove this, as the disease is very common in these countries. Perhaps the factor of sunburn has been assisted by changes in the quantity and composition of those factors which affect the other organs. It would be in harmony with the theory that cancer is a general disease, and with my analyses of the occupational cancer statistics in England, that the increase of skin cancer is one of the factors that is responsible for the decrease of mortality.

Skin cancer patients show multiple primary tumours more often than persons suffering from cancer of the viscera. In part the longer duration of the illness and the size of the lesion may be responsible for this fact. But there are also multiple simultaneous primary skin cancers which are not far removed from each other—e.g., in the face. This fact has been reported, but the circumstances and the incidence have not been sufficiently analysed. We cannot therefore say whether the incidence of multiple primary tumours corresponds to the average, or whether it is greater or less. If 60 per 10,000 of the people between the ages of 50 and 60 annually develop cancer and live three years on an average, it means that there are approximately 180 per 10,000 cancer patients alive at one time. The probability of these patients acquiring a second primary tumour (in another organ) should be the same as that of healthy people acquiring a first primary tumour, on the ground that the tumour is only a local manifestation. But they should have a smaller chance than the average of people of the same age if immunity results from the first primary tumour, or if the first tumour is a symptom of a general disease. Unfortunately the studies of Bibello and Montanini (6 per 1000), Hanton (20 per 1000), Nichols (26 per 1000), Schreuner and Wehr (27 per 1000), and Owen (48 per 1000) on the incidence of multiple primary cancer do not enable us to draw any conclusions, as they do not consider age and duration of illness.

The investigation, which Cramer proposed, would be of special importance—i.e., to find out in what proportion people who have been cured of skin cancer develop cancer in other sites. From my own studies of occupational cancer statistics I find a lower incidence.

It also may be interesting to quote here the following: of 1546 post-mortem cases with cholelithiasis Sternberg[18] found that a quarter (392) had developed cancer; that is a little more than in the average of the population of the same age. But the distribution of sites was very different: cancer of the bile passages was especially frequent (32 per cent. of all cancer cases instead of 8–10 per cent.); the other sites were partly not diminished, partly diminished, and no skin cancer at all was found.

Similar analyses carried out systematically and accurately would be the first step in discovering whether the production of a primary tumour in one organ brings immunity to the others. In large cities such an investigation could be very instructive, as cancer patients are carefully observed and registered and a great number are examined post mortem.

LABORATORY EXPERIMENTS

We should not draw conclusive deductions about human cancer from experiments on animals; the following data should therefore be regarded with all due caution. In animals we have, besides experimental cancer, hereditary spontaneous cancer (Maud Slye, Little). The localisation as well as the incidence of the latter are a hereditary quality. Dobrovolskaia-Zavadskaia has studied the question whether exogenous factors can bring about changes in animals that are inclined to certain spontaneous cancers. She took female mice from a strain in which 71 per cent. of the females acquired spontaneous cancer of the mamma. To 47 of those that were still healthy she introduced subcutaneously enough radon to produce burns without lethal effect. Then she observed, after the latent period, whether a tumour developed at the irritated spot or in the mamma. She concludes that external irritations are "évidemment insuffisant pour modifier les potentialités constitutionelles de différentes glandes mammaires et les tumeurs se sont développées en dehors de la zone irritée, probablement sur les points héréditairement prédisposés au cancer de la mamelle"[19]; nevertheless she also shows that there were local neoplastic reactions.

Let us try to analyse this experiment from the point of view of our problem. Of the 47 females 71 per cent.—i.e., 33—ought to have developed a mammary cancer. According to the two reports, only 22 developed an adenocarcinoma of the mamma and 11 developed other malignant tumours (sarcomata) at the irritated spot (exclusive of the mamma). That means, first, that 33 animals in all developed cancers—the same number that was to be expected without any special irritant—and, secondly, a considerable change in position was effected; in a third the tumours did not develop at the site where it would be expected to have developed spontaneously, and they also showed a different histological structure. In none of these 11 mice did a spontaneous tumour of the mamma develop in addition to the provoked tumour. This result of the experiment apparently agrees with my theory. It is unfortunate that the ages at which the animals developed the cancer are not stated, and it would be very desirable to carry out the experiment on a large scale, with strains of mice in which the spontaneous tumours develop in internal organs. We must remember, however, that such an experiment could not be conclusive in its relation to human cancer.

SUMMARY AND CONCLUSIONS

Statistics of the mortality from cancer of the various organs in certain occupations and the connexion between cancer morbidity and pregnancy conflict with the theory of the local origin of cancer. The analyses show that an increase of carcinogenic irritation leads to an increase of cancer at the irritated spot, but there is not a corresponding rise in the total incidence. This increased irritation leads also to a decrease in the incidence of cancer in some of the other organs.

If malignant tumours decrease in organs that are not at all, or hardly, accessible to treatment, this transfer of the site of the primary tumour means a decrease of cancer mortality, although the morbidity remains the same or may even be slightly raised.

The significance of carcinogenic irritation in the study of cancer now takes on quite a different aspect. Through increased irritation an active transfer of the site of the primary tumour can be effected—i.e., by applying light rays to suitable surfaces of the skin in an intensity that is just sufficient to provoke skin cancer, one could reduce the number of inaccessible and more malignant cancers. The necessary amount of irritation could probably be reduced by using tonsil extracts as they increase the susceptibility of the skin to light rays.

REFERENCES

1. Peller, S.: Zeits. f. Krebsforsch., 1925, xxii., 317.
2. Prinzing, F.: Handb. der med. Statistik., Jena, 1930–31.
3. Roesle, E.: Arch. f. soz. Hyg. u. Demog., 1931, vi., 1.
4. Wolff, G.: Deut. med. Woch., 1928, liv., 399.
5. Schinz, H. R., and Senti, A.: Strahlentherapie, 1933, xlviii., 51.
6. Peller, S.: Zeits. f. Krebsforsch., 1934, xl., 465.
7. Carter, W. C. M.: Amer. Jour. of Cancer, 1934, xix.
8. Ewing, J.: Internat. Cancer Congress, Madrid, 1933.
9. v. Franque, O.: Monats. f. Krebsbekämpf., 1934, ii., 129.
10. The Registrar-General's Decennial Supplement, England and Wales, 1921, London, 1927.
11. Peller, S.: Wien. klin. Woch., 1922, xxxv., 121; Arch. f. Gynäk., 1923, cxviii., 59.
12. Peller, S., and Stöhr, W.: Zeits. f. Krebsforsch., 1929, xxviii., 266.
13. Cramer, W.: THE LANCET, 1934, i., 1.
14. Peller, S., and Rubinstein, B.: Klin. Woch., 1934, xiii., 1216.
15. Peller, S.: Zeits. f. Konstit., 1933, xvii., 604.
16. Roffo, A. H.: Bol. Inst. de Med. Exp., 1933, x., 417; THE LANCET, Feb. 29th, 1936, p. 472.
17. Peller, S.: Internat. Cancer Congress, Madrid, 1933.
18. Sternberg, C.: Wien. med. Woch., 1935, lxxxv., 795.
19. Dobrovolskaia-Zavadskaia, N.: Compt. rend. Soc. de biol., 1935, cxix., 83, 360.

Jerusalem.

IMPAIRED GLUCOSE TOLERANCE IN CERTAIN ALIMENTARY DISORDERS OF CHILDHOOD

WITH REMARKS ON THEIR TREATMENT WITH LIVER EXTRACT

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THE knowledge of glucose tolerance has recently been much clarified so that it is now possible to state three axioms as a basis for further work. These may be expressed as follows:—

1. The tolerance of an individual for glucose is directly proportional to his sensitivity to injected insulin. The relation of the two properties is in fact a linear one, and glucose tolerance may be regarded as sensitivity to the endogenous insulin.
2. Insulin sensitivity is due to the presence in the body of a third factor in the glucose-insulin reaction, now usually referred to as "insulin kinase."
3. The degree of insulin sensitivity and hence the glucose tolerance of a healthy individual is determined solely by the amount of carbohydrate the diet has contained for the period preceding the test.

In the normal subject carbohydrate deprivation will lead to impaired glucose tolerance, which will be shown by a high and rather slowly-falling blood-sugar curve following the administration of glucose, whether by the alimentary tract or intravenously; while carbohydrate excess will lead to an opposite condition of improved tolerance, with a low curve in both cases. Such a series of curves obtained from a healthy boy of 5 is shown in Fig. 1.

In the presence of any disease process such as to hinder or prevent the absorption of glucose from the gut, one would expect a different state of affairs, for here the curve after oral administration should be of the flat type from failure of sugar to reach the blood, while the intravenous one should be high as a result of the same impairment of tolerance as would follow carbohydrate deprivation in a normal person. Further, if this is so, and if deprivation of carbohydrate by failure of absorption is the sole reason for the impairment of tolerance observed when a test dose of glucose is given intravenously, then the tolerance should be restored to normal by supplying the body with glucose by the intravenous route over a suitable period of time. In the following sections it will be shown that both of these results have been obtained in cœliac disease, and the former in chronic intestinal indigestion and in abdominal tuberculosis.

Finally, attention has been turned to the possibility of affecting glucose tolerance and insulin sensitivity by the actual administration of some substance containing insulin kinase. There are a number of reasons for believing that kinase is normally prepared, at least for the major part, in the liver, and hence it was decided to ascertain the effect of an injectable extract of liver upon cases of impaired tolerance. Campolon was selected as being likely to contain any such principle as kinase, since it is prepared by expression methods. Its injection intravenously was not recommended by its makers, but the only adverse effect produced was some pulse acceleration and a peripheral flush of the histamine reaction type with a sense of great heat, the whole passing off in about three minutes. An effect having been obtained in this way attention was turned to the simpler method

of oral administration of liver extract. It was found that either the injection of campolon intravenously or the administration of liquid extract of liver by mouth led to considerable improvement of tolerance in all three of the disorders considered.

The results of the experimental procedures, together with some remaining special points, will now be briefly considered.

CŒLIAC DISEASE

The fact that the oral glucose-tolerance curve in cases of cœliac disease is frequently of a flat type has received widespread recognition for many years; but the interpretation to be placed upon these curves has remained a matter of debate. There are three outstanding views. The obvious and simplest suggestion is that these cases have a defective power to absorb carbohydrate comparable with their well-established failure in the matter of fat—a glycorrhœa as well as a steatorrhœa.

Thaysen[1] made objection to this simple view for three reasons:

(*a*) "Following intravenous injection of glucose, patients with flat blood-sugar curves show a flatter curve than do normal persons." This finding we are quite unable to confirm in any of the three diseases we have worked upon. It would, of course, be true where the low oral curve is due to increased tolerance following upon a high carbohydrate régime (Fig. 1).

(*b*) "After administration of glucose by the mouth the respiratory quotient rises to 1 or to about 1." We have not done any work on this point.

(*c*) "On a diet rich in carbohydrates the respiratory quotient is higher than on a mixed diet as in the case of normal persons." This does not seem to demonstrate that there is no defect in absorption, for it might well follow if the higher diet led merely to a slight quantitative improvement in intake.

Thaysen's final view was that "the flat blood-sugar curve is due not to deficient absorption, but in all probability to a disturbance in the regulation of the blood-sugar."

Himsworth[2] explains the flat curves on another basis.[3] He points out that, as a result of their relative inability to absorb fat, these patients are living largely on carbohydrate and hence show the improved tolerance which normally results in such circumstances. If this were the explanation, the intravenous glucose-tolerance curves should also be low, whereas we have found them to be high in all of the 15 cases so far examined, even though some of these did not show gross flattening of the oral curve.

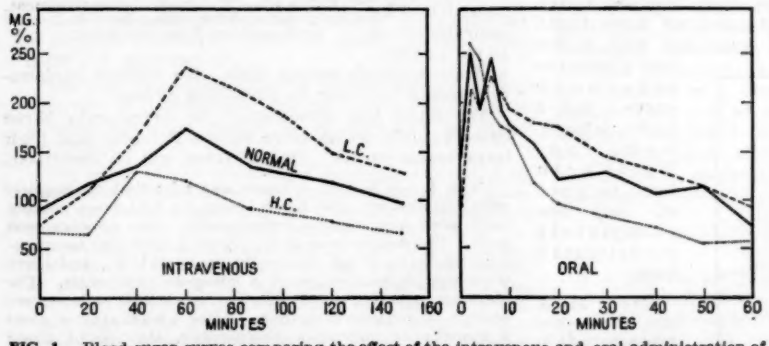

FIG. 1.—Blood-sugar curves comparing the effect of the intravenous and oral administration of glucose in a normal child. The curve taken under normal conditions shows a high fasting level and some irregularity, owing to a large emotional factor; in the other curves the patient was tranquil and these features are absent. L.C. was made after three weeks on a diet free from all gross carbohydrate; H.C. five days after an ordinary diet with 150 g. of glucose added daily.

In this preliminary note it will suffice to present a few of the actual findings.

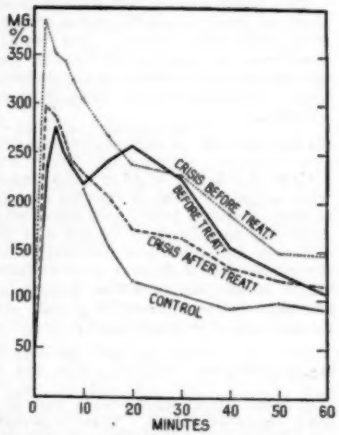

FIG. 2 (Case 1).—Blood-sugar curves before treatment, and during crisis before and after intravenous glucose treatment, compared with that of a normal patient of similar age and weight (the first 10 mins. are omitted to avoid confusion).

CASE 1.—A female child of 22 months was admitted to hospital with the history that she had been well until 5 months previously when the stools became large, pale, often slimy, and rather frequent. She began to lose weight, and the abdomen became noticeably large, while the buttocks underwent a diminution in size. The fæces at this time showed a daily fat output of 16·5 g. (73·1 per cent. of the dried fæces collected over 5 days). An oral glucose-tolerance test at this time gave the following result (15 g. as 20 per cent. solution):—

	Fasting	10	20	40	60	90	120 mins.
Mg. per 100 c.cm.	54	84	96	90	78	72	61

An intravenous glucose-tolerance test showed a gross impairment of tolerance (Fig. 2, solid line).

Having improved considerably she was discharged in 17 days to carry on treatment at home. This was not successful and 6 weeks later she was readmitted in very poor condition, having diarrhœa of a gross degree. Treatment along the usual lines followed for some 10 days. By this time dietary measures had reduced the motions to about 4 per diem, but the child was desperately weak and vomiting once or twice a day. In the belief, founded partly on her previous low fasting blood-sugar levels, that hypoglycæmia was the cause of much of the trouble, continuous intravenous treatment with glucose solution was decided upon. This was initiated by an intravenous glucose-tolerance test, at the conclusion of which 63 g. of glucose were run in over 43 hours, in the form of 10 per cent. solution in normal saline. Five hours after the completion of this, a further intravenous glucose-tolerance test was carried out. Fig. 2 shows the curves obtained on this occasion (the former as a dotted, the latter as a pecked line). The clinical result of the treatment was a dramatic improvement, the credit for which must probably be shared with a blood transfusion which immediately followed. It is interesting to note that, after having whimpered ceaselessly for days when not asleep,

[1] Thaysen, T. E. Hess: Quart. Jour. Med., 1935, iv., 359.
[2] Himsworth, A. P.: THE LANCET, 1934, ii., 845.
[3] Since this note was written Dr. Himsworth has withdrawn this suggestion in the light of such further evidence as I was able to offer. (*Vide* Trans. Roy. Soc. Trop. Med. and Hyg., 1936, xxx., 33, 54.)

the child lay completely at peace after the first 10 g. dose of glucose, saying she was "bett."

Five weeks later a similar emergency arose and the same line of treatment was adopted. The tests done on this occasion showed almost identical results, and the clinical improvement was again most gratifying.

Two months later her condition was so far improved that an oral glucose-tolerance test could be carried out with reasonable safety. Its result is noted lest the diarrhœa existing at the time of the previous oral test should be put forward as the cause of impaired absorption. The dose was, as usual, 30 g. given as 20 per cent. solution.

	Fasting	20	40	60	90	120	150 mins.
Mg. per 100 c.cm.	69	78	99	108	92	75	69

CASE 2.—A boy of 18 months was admitted to hospital with a history that 2 months previously he had begun to have frequent loose, pale stools and to vomit occasionally. He had become listless and lost weight, and the abdomen had increased perceptibly in size. Analysis of the stools over 3 days showed a daily output of 9·2 g. of fat, of which one-third was neutral fat. An oral glucose-tolerance test was done (26 g. only of the 30 g. dose were taken), with the following flat result:—

	Fasting	20	40	60	90	120	150 mins.
Mg. per 100 c.cm.	80	95	111	111	103	90	82

The result of an intravenous test is represented by the solid curve in Fig. 3. This, of course, indicates a considerable impairment of tolerance. He was given ½ oz. of liquid extract of liver (B.P.) twice daily for 14 days, and the tests were repeated. The oral result was almost identical with the previous one except for a higher fasting level—91 mg. per 100 c.cm. The intravenous result showed a moderate improvement of tolerance, the level at 60 mins. being 53 mg. per 100 c.cm. lower than before (Fig. 5, pecked curve). The administration of liver was now stopped for two weeks and the curves repeated. The oral one was again practically unaltered, while the intravenous had reverted almost to its previous level.

CHRONIC INTESTINAL INDIGESTION

The symptomatology of this disease has led to the very general adoption of reduced carbohydrate diets in its treatment in order to reduce bowel fermentation, with very good results; but there seems to have been little or no work done upon the absorptive function. In 10 cases investigated we have found a normal fæcal fat output associated with a flat oral glucose-tolerance curve, and a high intravenous one. Details can here be given of only one completely investigated case.

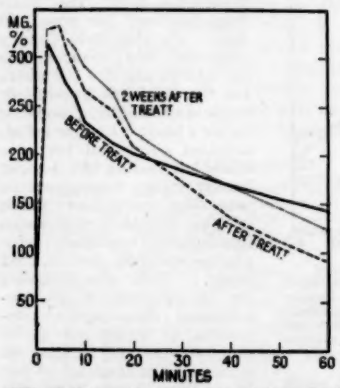

FIG. 3 (Case 2).—Curves before and immediately after two weeks' liver treatment, and two weeks after ceasing treatment.

CASE 3.—A girl of 4 years was admitted to the hospital with the history that she had been a "feeding problem" since infancy, having spent a long period in an institution on this account. The abdomen had always been prominent, though the buttocks were normal. The appetite was always poor. The weight was 27 lb.

The fæces were analysed and found to contain only 1·6 g. of fat daily. An oral glucose-tolerance test (30 g.) gave a curve of the flat type, showing:—

	Fasting	20	40	60	90	120	150 mins.
Mg. per 100 c.cm.	61	80	101	127	92	84	78

An intravenous test gave a high curve. Ten days later this test was repeated with the intravenous administration of 2 c.cm. of campolon 6 minutes in advance. The curve then obtained was appreciably lower (Fig. 4). After this test the patient was put upon a diet qualitatively low in carbohydrate and high in protein and fat. At first there was difficulty in getting her to take it, but this notwithstanding she gained 4 lb. in the ensuing 8 weeks. She was then transferred to a convalescent hospital, and while the diet was maintained, treatment by ½ oz. of liquid extract of liver (B.P.) was commenced. The weight rose from 31 lb. to 36½ lb. in the following 6 weeks, and the child looked the picture of health. In demeanour too she had changed from silent, easily tearful depression to merry, playful activity. Her progress was then interrupted by a sharp attack of follicular tonsillitis, which entailed the loss of 2 lb. in weight. A week after the temperature became normal, however, she had begun to regain this loss, and a final intravenous test was done. This curve (dotted line, Fig. 4) showed practically normal tolerance.

It may be of interest to add that there was but little change in the blood during treatment, for the hæmoglobin rose only from 89 per cent. to 96 per cent. (Haldane) and the colour-index from 0·93 to 0·98.

ABDOMINAL TUBERCULOSIS

The existence of flat oral glucose-tolerance curves in abdominal tuberculosis has long been recognised, and clinicians of high standing, notably the late John Thomson, have taught the desirability of low carbohydrate and high protein diets. No definite explanation seems, however, to have been offered.

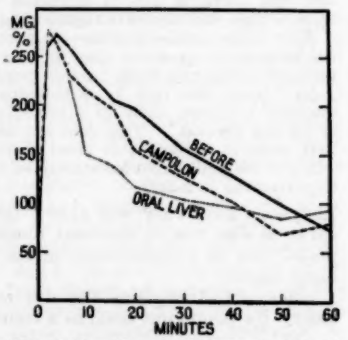

FIG. 4 (Case 3).—Curves before treatment, 6 mins. after campolon, and after prolonged oral liver treatment.

We have had opportunity to investigate three cases to date which have shown flat oral and high intravenous curves. One of these will be described.

CASE 4.—A boy of 9 years was admitted to hospital with the history that for 6 weeks he had been getting very weak and wasting considerably. The appetite was poor. The weight was 42 lb. After a week the temperature began to swing erratically up to 101° F., and there were the physical signs of a subacute peritonitis. The Mantoux reaction at a dilution of 1/1000 was severe enough to produce ulceration. After a total stay of some 4 months he improved considerably, the weight rising to 46½ lb., and was sent to a convalescent home. There he remained quiescent for some 10 weeks before commencing to lose weight and to run a swinging temperature once more, with evening rises up to 100° F. After a month of this, his weight having fallen to 44 lb., he was returned to hospital with a very poor prognosis. He was now quite unable to stand, even with assistance. An oral glucose-tolerance test gave the following figures (30 g.):—

	Fasting	20	40	60	90	120	150 mins.
Mg. per 100 c.cm.	64	93	129	136	111	108	97

An intravenous test showed a gross impairment of tolerance (Fig. 5, upper curve). After an interval of ten days, a further intravenous test was carried out, with an injec-

tion of 2 c.cm. of campolon in 30 c.cm. of normal saline 10 minutes previously. The curve obtained showed that the tolerance had been improved to a state which we have come to regard as normal (Fig. 5, lower curve). The patient was now left without special treatment for 4 days and an ordinary intravenous test carried out. The result was almost identical with that of the first test. He was then given 1 oz. of liver extract (B.P.) daily for two weeks and the intravenous test was repeated. Apart from a small rise in the fasting level (from 66 to 84 mg. per 100 c.cm.) this curve is almost identical with that following the injection of campolon. The liver treatment was carried on uninterruptedly, and 4 months later a precisely similar curve was obtained, the fasting level having risen, however, to 99 mg. per 100 c.cm. The hæmoglobin rose during the liver treatment from 86 to 94 per cent. (Haldane) and the colour-index from 0·88 to 0·9. The weight, which had fallen to 42 lb. when liver therapy was commenced, rose in the following period of 11 weeks to 53½ lb. Although in the past 5 weeks there has been no further gain in weight the boy's general condition is excellent, and he is up for most of the day, having regained completely the ability to walk—and even to run—after being bedridden for about 11 months.

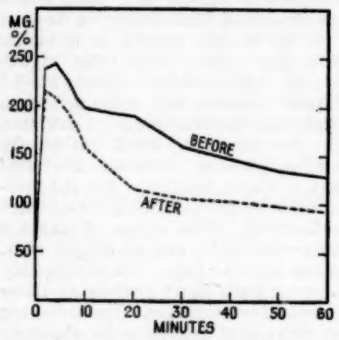

FIG. 5 (Case 4).—Curves before treatment and after remission of treatment for four days (too close to be plotted separately), and after intravenous campolon and oral extract of liver for two weeks and four and a half months respectively (too close to be plotted separately).

CONCLUSION

The association of a flat oral glucose tolerance curve with a high intravenous one has been demonstrated in cœliac disease, chronic intestinal indigestion, and abdominal glandular tuberculosis. It is believed to indicate a deficient power to absorb carbohydrate from the intestine.

Further, the administration of liver extract, either enterally or parenterally, has been shown to improve glucose tolerance where it is impaired in these conditions.

The whole of the blood-sugar estimations involved in this research, amounting to very many hundreds, have been carried out according to a special microchemical method by Miss Eva Tonks, without whose enthusiastic coöperation the work would hardly have been possible. For access to cases my most cordial thanks are offered to the members of the honorary medical staff of the Children's Hospital, Birmingham, everyone of whom has placed cases at my disposal; in particular it is a pleasure to express my indebtedness to Prof. L. G. Parsons for his constant help and encouragement. The expenses of this work have been met by a grant from the Medical Research Council.

NORTH DEVON INFIRMARY, BARNSTAPLE.—The ordinary income of this hospital last year was £6604, the largest in its history; the ordinary expenditure was £7355. The number of patients taking advantage of the contributory scheme is increasing but the continuous decline in the amount received from church collections is considerable, the amount received having fallen by about half in seven years.

INTRAVENOUS OR INTRAPERITONEAL ANTITOXIN TREATMENT

COMBINED WITH SHORT ISOLATION PERIOD IN SCARLET FEVER

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IN two previous papers,[1 2] a remarkably low incidence of complications was recorded in 1204 cases of scarlet fever treated with intravenous antitoxin and detained in hospital for an average period of only 16·6 days. The present communication deals with a more extensive and controlled trial of antitoxin treatment under field conditions in a large London fever hospital. The investigation consists of two main parts: (1) a series of 1877 cases treated with intravenous serum and controlled with a non-serum treated series of 1419 cases, mostly in separate wards, during the years 1933 and 1934 (Table I.); (2) an "intravenous" series of 551 cases controlled by the method of alternate admissions with a series of 540 cases treated intraperitoneally during the year 1935 (Table II.). In addition there are two subsidiary series: (*a*) an initial experiment in intraperitoneal serum treatment comprising 192 unselected cases admitted to separate "intraperitoneal" wards during the last quarter of 1934; (*b*) the remaining cases of scarlet fever treated during the three-year period of the investigation. These had antitoxin intramuscularly, and they form a small composite group of 282 cases which has been included for completeness (Table III.).

The period of isolation in hospital in the intravenous and intraperitoneal groups was short—viz., 18·2 days and 21·2 days respectively. In the non-serum and intramuscular groups this period conformed more to orthodox practice, the average in the non-serum group being 33·9 days. In calculating these average periods (and for this purpose only) cases detained in hospital for conditions unassociated with scarlet fever —e.g., intercurrent whooping-cough—were excluded, the exclusions numbering 73 in the venous, 10 in the peritoneal, and 106 in the non-serum series. No exclusions whatever have been made in respect of other statistical data set out in the tables, with the exception of 2 cases in which the acute stage of scarlet fever and of measles was concurrent. The material comprised in the tables thus consists of *all* verified cases of scarlet fever completed in the hospital—i.e., discharged, transferred, or died during the years 1933–35.

SHORT ISOLATION PERIOD: AFTER-CARE AND INFECTIVITY

The stay in hospital of 2–3 weeks in the venous and peritoneal groups may appear to be too short a period of observation on which to base statistics of complications. It may be contended that a substantial number of the later complications of scarlet fever may have occurred after discharge of the patient. My experience of the intravenous method throughout a period of nearly eight years does not support this view. The course of both simple and septic scarlet fever after venous or peritoneal antitoxin is quite different from that of the non-serum series. The acute stage is cut short and the disease process aborted. In the type of scarlet fever dealt with in these investigations, patients treated with a single injection of 10–20 c.cm. antitoxin venously or peritoneally within the first three days of the

disease usually experienced a feeling of well-being after 4–6 hours, relief of local angina in 6–12 hours, and disappearance of the rash in 24–36 hours. They were generally fed on ordinary diet on the second or third day after treatment, and were allowed up on the 5th-7th day. Desquamation was rare and, if present, was usually restricted to the tips of the fingers. Complications were few. With nutrition almost unimpaired, the vast majority were well and ready for discharge after 10–14 days in the case of adults, and 14–21 days in the case of children. If a complication occurred, it was, of course, treated until the patient was well—e.g., in otitis media until the ear was dry by otological examination for at least a week. In the case of specially debilitated children, the period was extended for a week or two, but rarely beyond 4½ weeks on account of the danger of secondary infections and especially relapse.

It is freely admitted that a scheme of out-patient observation for a week or two after discharge in these circumstances is desirable. This was done in the Leicester cases.[1 2] In the present series it was not found possible to arrange it owing to the distances to be travelled in London. Instead, a scheme of urine examination was adopted. The parents were asked to post a specimen of urine to the Southern Group Laboratory on a date corresponding to the 24th day of disease. When a specimen was found to be abnormal, a form was sent out inquiring whether the child was well and requesting another specimen. The following response was obtained to this method of after-care: Of the 2232 specimen bottles issued, 2093 or 93·7 per cent. were returned, and 29 were found to contain more than a trace of albumin or to show, in the centrifuged deposit, some red blood-cells or casts. Of these 29 cases 24 became normal within 14 days, 2 within 28 days, and 2 were untraced. The single remaining case was readmitted with a mild nephritis. In all these cases except the last, the affected child remained apparently well without treatment—i.e., the condition was subclinical. Information was received from another source of a second case of nephritis and this was readmitted. It proved to be symptomless under treatment. From other sources, information was obtained of the following complications occurring after discharge: one case each of albuminuria, otitis media, carditis, and relapse.

In the smaller non-serum series with a much longer isolation period complications known to have occurred after discharge comprised one case of otitis media and two relapses. These cases have all been included in the tables. Repeated inquiries in local medical circles failed to reveal any other complications. Neither in the previous nor the present investigations has evidence been obtained of the occurrence of complications to any material extent after an isolation period in hospital of 2–3 weeks.

Short isolation periods in hospital for uncomplicated cases of scarlet fever (whether serum treated is not stated) have been tried in recent years by Gordon.[3] He found that "the infecting case rate did not increase when adults were isolated for periods as short as 2 weeks and children for 3 weeks," and for adults at least there was no apparent deleterious effect clinically. Brown and Allison[4] state, with regard to the liability of the patient to acquire secondary infections and infectivity in hospital, that "it is advantageous both to the patient and to the hospital administration that they should be discharged as early as is consistent with a satisfactory clinical condition." Otherwise, their streptococcal immunity being still low at this stage, they are apt to be reinfected with extraneous strains of streptococcus (Gunn and Griffith[5]) and to develop secondary tonsillitis, cervical adenitis, otitis, and relapse. From a study of results of bacteriological typing of strains of streptococcus in throat and nose swabs Brown and Allison concluded that detention beyond the fourth week of the disease results in a higher proportion of infecting cases until the eighth week, when the rate again falls. Greenwood[6] examined the relation between the average length of stay in 23 hospitals and the percentage of infecting cases discharged. He found a small but hardly significant positive correlation between the two factors. There was a slight tendency for the proportion of infecting cases to increase with the average length of stay in hospital. The range of average durations in his data were wide, and in 42 per cent. the mean stay was less than 43 days, but presumably his report did not cover such short periods as those employed in the present investigation. The infecting case rates in these short-stay groups were about or just under normal for London—viz., 3·5 per cent. for the venous, 3·4 per cent. for the peritoneal, while they were 2·1 per cent. for the muscular and 2·9 per cent. for the non-serum series, the two latter series including an undue proportion of very mild cases. These rates are very similar to those of Brown and Allison[4] (3·7 per cent.) in a neighbouring hospital for a series isolated 4–8 weeks or more during the same years. The worst age-group for infectivity, as in Brown and Allison's and also Cameron's[7] cases, was 5–10 years—viz., 5·2 per cent., 5·4 per cent., 4·7 per cent., and 3 per cent. in the venous, peritoneal, muscular, and non-serum series respectively.

The data set out in the tables includes a small proportion of cases transferred to convalescent hospitals. At the outset, in the year 1933, the first 32 venous cases after 10–14 days' stay in the Park Hospital, were kept under special observation in the Southern Convalescent Hospital for periods averaging about a month. Dr. A. Topping, medical superintendent of the latter hospital, reported that no complications occurred in these cases. The remaining cases transferred in the venous and peritoneal groups were insignificant in number (16 and 7 respectively) and were transferred at a late stage in convalescence varying from 1–3 months after admission on account of persistent otorrhœa or because of difficulties of accommodation at home. There were 69 cases transferred to convalescent hospitals in the non-serum series chiefly for the same reasons.

INTRAVENOUS SERUM TREATMENT COMPARED WITH NON-SERUM TREATMENT

During 1933, with the exception of the first few weeks, an attempt was made to divide the scarlet fever wards into two equal groups (*a*) intravenous wards and (*b*) non-serum wards. Cases were admitted indifferently to these wards according to the vacant beds available in each, but, after some six months, when the superior results of the intravenous method became obvious, there was a tendency at the receiving-room towards preferential admission of the severer cases to the intravenous wards. It was considered desirable, in order to minimise secondary infections in the venous series, to nurse them separately, as far as possible, from the non-serum cases. In the intravenous wards the proportion of cases treated with intravenous serum was generally about 80 per cent., the remainder being cases too mild for serum treatment, or admitted at a late stage of the disease, or cases in which intravenous serum was

contra-indicated or impracticable on account of the age and small size of the patients. The latter were generally injected with serum intramuscularly and they appear in the composite intramuscular group (Table III.). The environmental and other conditions were exactly similar for each group. The wards were of identical design, bed spacing similar (10 to 12 feet between heads), the nursing staff of the same quality, and the medical staff common to both series.

During the year 1934, owing to the evident superiority of the intravenous treatment, most of the scarlet fever wards became intravenous wards, and the non-serum series for that year was very small, consisting chiefly of cases too mild for serum treatment. *The non-serum controls therefore include an undue proportion of mild cases both from the latter part of 1933 and from 1934.* Thus, no case of rhinitis (excluding diphtheritic) is recorded among the non-serum cases in 1934, although there were 9 among the intravenous cases; further, the incidence of otitis media under 5 years amongst the non-serum controls is even less than that among mild cases at the same age in Goodall's [8] data—viz., 11·9 per cent. as against 13·73 per cent. The controls in Table I. therefore provide a more stringent test of the efficacy of intravenous treatment than if the two series had been equal in severity. In Table I. the figures for the two years have been added together in order to economise space.

Deaths.—In the intravenous series there were two deaths: (1) a boy, aged 16, with osteo-myelitis and a scarlatiniform rash, comatose on admission, died within 24 hours of admission; (2) a mongol, aged 9, admitted moribund on 9th day of disease, died 4 hours after admission. The deaths in the control series were 12, the causes being septic scarlet fever, nephritis, carditis, meningitis, toxæmia, and pneumonia.

Complications.—All complications, however trivial, so long as they occurred after admission and were considered to be due to scarlet fever, have been included equally in the series. Those which were considered to be due to some intercurrent disease have been excluded. In order to ensure accuracy in this report every bed-card has been scrutinised and assessed by me personally.

"Otitis" is restricted to cases of purulent otitis media. "Nephritis" indicates cases having hæmaturia as well as albuminuria. In the venous series it was so mild that only one case (the readmitted case) showed any œdema. Amongst the controls, on the other hand, more than half the cases had symptoms—e.g., œdema, vomiting, pyrexia. "Carditis" is restricted to cases in which there was evidence of organic damage—e.g., simple and ulcerative endocarditis and arrythmia. "Simple adenitis" denotes any enlargement of glands, accompanied by pyrexia (even 99° F.), occurring after defervescence of the primary fever. "Minor septic foci" are abrasions about the nares or angle of the mouth, or trivial skin sepsis. These are not often included amongst "complications" and might be deducted from the total.

The low incidence of otitis media in the venous series (3·8 per cent. compared with 11·9 per cent. in the controls for the age-group 0–5 years) is especially worthy of comment. It is commonly held that otitis media is the complication least influenced by antitoxin. By the use of the intravenous route and a short isolation period its incidence in this experiment has been reduced to about one-third of that in the control series for all ages. Similarly the incidence of nephritis has been reduced to about one-seventh of that of the controls at the age-group 0–5 years, and the reduction at higher ages is even greater. These findings for the two most important complications of scarlet fever seem worthy of emphasis. Rheumatism has been reduced at least to one-third of its incidence in the non-serum treated cases, and carditis to so low a figure as to be amost negligible. The minor condition,

TABLE I.—INTRAVENOUS ANTITOXIN TREATMENT OF SCARLET FEVER AND NON-SERUM CONTROLS. (1933 AND 1934.)

Age	0–5				5–10				Over 10			
	Intravenous.		Non-serum.		Intravenous.		Non-serum.		Intravenous.		Non-serum.	
	Cases.	Per cent.	Cases.	Per cent.	Cases.	Per cent.	Cases.	Per cent.	Cases.	Per cent.	Cases.	Per cent.
Completed cases	469	—	563	—	755	—	490	—	653	—	366	—
Deaths	—	—	5	0·9	1	0·1	4	0·8	1	0·1	3	0·8
COMPLICATIONS OCCURRING AFTER ADMISSION												
Purulent otitis media	18	3·8	67	11·9	13	1·7	24	4·9	4	0·6	6	1·6
Mastoiditis	1	0·2	4	0·7	—	—	3	0·6	—	—	—	—
Nephritis	2	0·4	12	2·1	1	0·1	8	1·6	1	0·1	5	1·4
Albuminuria	1	0·2	6	1·1	1	0·1	4	0·8	3	0·4	—	—
Rheumatism	—	—	1	0·2	4	0·5	6	1·2	7	1·1	16	4·4
Carditis	—	—	1	0·2	—	—	2	0·4	1	0·1	2	0·5
Adenitis—												
Simple	27	5·8	37	6·6	17	2·2	23	4·7	19	2·9	10	2·7
Suppurative	5	1·1	6	1·1	—	—	6	1·2	1	0·1	1	0·2
Tonsillitis	4	0·8	6	1·1	2	0·3	5	1·0	11	1·7	12	3·3
Abscess	2	0·4	8	1·4	1	0·1	3	0·6	2	0·3	—	—
Relapse	1	0·2	8	1·4	4	0·5	4	0·8	1	0·1	1	0·2
Vaginitis	3	0·6	7	1·2	—	—	4	0·8	1	0·1	—	—
Jaundice	—	—	4	0·7	1	0·1	1	0·2	1	0·1	1	0·2
Minor sepsis, onychia	11	2·3	14	2·5	11	1·4	9	1·8	4	0·6	6	1·6
Impetigo, dermatitis	—	—	6	1·1	1	0·1	5	1·0	—	—	3	0·8
Rhinitis, rhinorrhœa	5	1·1	17	3·0	6	0·8	9	1·8	2	0·3	3	0·8
Bronchitis, broncho-pneum.	2	0·4	10	1·8	—	—	—	—	—	—	1	0·2
Others	3	0·6	2	0·3	6	0·8	—	—	1	0·1	2	0·5
Total complications	85	18·1	216	38·3	68	9·0	116	23·7	59	9·0	69	19·0
INTERCURRENT INFECTIOUS DISEASES OCCURRING AFTER ADMISSION												
Diphtheria	3	..	45	..	2	..	40	..	—	..	4	..
Measles	7	..	8	..	2	..	5	..	—	..	—	..
Whooping-cough	11	..	19	..	1	..	1	..	—	..	—	..
Chicken-pox	6	..	18	..	5	..	12	..	—	..	1	..
Others	4	..	33	..	10	..	13	..	2	..	4	..

simple adenitis, has remained somewhat high in the venous series (3·5 per cent. under 10 years compared with 5·7 per cent. in the controls) and about equal at higher ages. The condition is possibly often dependent upon previous enlargement of the cervical glands. Complications depending particularly upon secondary infections—e.g., tonsillitis, relapse, vaginitis, persistent rhinitis—have also been strikingly reduced to about one-third of the incidence in the controls.

Intercurrent infections.—The considerable reduction in intercurrent infectious diseases (including those incubating on admission) which occurred in the venous series is believed to be chiefly associated with the shorter stay in hospital and consequent diminished risk of exposure to infection. The very striking reduction in post-scarlatinal nasal diphtheria may, however, be partly attributable to the presence of a small amount of diphtheria antitoxin in the serum.

INTRAVENOUS COMPARED WITH INTRAPERITONEAL SERUM TREATMENT

During the latter quarter of 1934 a second experiment was begun, the new set of controls being injected with antitoxin intraperitoneally. During this period the scarlet fever wards were divided into two groups, intravenous wards and intraperitoneal wards, with a similar age- and sex-distribution for each group and admission to each group according to the vacancies arising. It was soon evident that results in the two groups were approximately equal. Hence, during 1935, all wards were made alike, alternate cases admitted being treated with venous and peritoneal antitoxin respectively. The only exceptions were a small proportion of cases which, owing to sensitisation, were believed to be unsuitable for intravenous therapy. These were treated intraperitoneally and the next two cases in each instance admitted intravenously. Table II. shows the results obtained during 1935 under this scheme of controls. It will be observed that the results in the two series are almost identical, and approximately equivalent to the results of the intravenous series shown in Table I. Perhaps the only figure calling for comment is that of the two deaths in the intravenous series. Both were unusual cases and of the same type, septicæmia and empyema occurring within a few days of the initial fall of temperature in two women aged 25 and 29 respectively.

In Table III. the whole of the cases treated during the three-year period have been brought together to show the striking effect of intravenous and intraperitoneal antitoxin, with short isolation period, on the death-rate and on the two principal complications of scarlet fever—viz., otitis media and nephritis. The infecting cases giving rise to return cases are also shown in age-groups. This Table includes 193 intraperitoneal cases treated during 1934, and also the small composite intramuscular series to which reference has been made above. They were mainly young cases in whom intravenous therapy was contraindicated or impracticable, but in whom the disease was severe enough to indicate serum treatment. The group also contains a proportion of young and very mild cases in which intravenous therapy was not considered worth the trouble involved.

The data have been examined statistically by Mr. W. T. Russell of the London School of Hygiene and Tropical Medicine. I am indebted to him for a report from which the following are extracts:—Table I.: "The incidence of complications and intercurrent infection is shown to be significantly lower amongst the intravenous treated than amongst the untreated or controls. Although the fatality-rates are lower than those for the controls at each age-period they are not significantly different. Since scarlet fever has become a rather mild disease, possibly fatality-rates are unsatisfactory as a test of the merits or demerits of a particular type of treatment." Table II.: "The two methods of injection (intravenous and intraperitoneal) give practically the same results." With regard to the exceptions from the strict practice of alternate classification due to some cases being unsuitable for intravenous therapy, they state that "if they are only a few, then no difficulty arises and the conclusion is justified." On re-examination

TABLE II.—INTRAVENOUS AND INTRAPERITONEAL ANTITOXIN IN SCARLET FEVER. (1935.)

Age	0–5				5–10				Over 10			
	Intravenous.		Intraperitoneal.		Intravenous.		Intraperitoneal.		Intravenous.		Intraperitoneal.	
	Cases.	Per cent.	Cases.	Per cent.	Cases.	Per cent.	Cases.	Per cent.	Cases.	Per cent.	Cases.	Per cent.
Completed cases	143	26	192	35	229	41	217	40	179	32	131	24
Deaths	—	—	—	—	—	—	—	—	2	1·1	—	—
COMPLICATIONS OCCURRING AFTER ADMISSION												
Purulent otitis media	6	4·2	9	4·6	6	2·6	3	1·4	1	0·6	—	—
Mastoiditis	—	—	—	—	2	0·9	—	—	1	0·6	—	—
Nephritis	—	—	1	0·5	1	0·4	—	—	—	—	—	—
Albuminuria	—	—	1	0·5	—	—	—	—	1	0·6	1	0·7
Rheumatism	—	—	—	—	1	0·4	1	0·4	1	0·6	3	2·3
Carditis	—	—	—	—	1	0·4	—	—	—	—	1	0·7
Adenitis—												
Simple	7	4·9	7	3·6	4	1·7	5	2·3	4	2·2	3	2·3
Suppurative	2	1·4	—	—	—	—	—	—	—	—	—	—
Tonsillitis	2	1·4	1	0·5	2	0·8	—	—	1	0·6	—	—
Relapse	4	2·8	2	1·0	1	0·4	2	0·9	—	—	—	—
Abscess, onychia	—	—	4	2·0	—	—	1	0·4	—	—	—	—
Minor septic foci	3	2·1	7	3·6	8	3·4	4	1·8	1	0·6	1	0·7
Persistent rhinitis	—	—	1	0·5	1	0·4	1	0·4	—	—	—	—
Others	—	—	1	0·5	2	0·8	3	1·4	6	3·3	1	0·7
Total complications	24	16·5	34	17·7	29	12·7	20	9·2	16	8·9	10	7·1
INTERCURRENT INFECTIOUS DISEASES OCCURRING AFTER ADMISSION												
Diphtheria	2	..	1	..	—	..	1	..	—	..	1	..
Measles	—	..	1	..	—	..	—	..	—	..	—	..
Whooping-cough	1	..	2	..	1	..	—	..	—	..	—	..
Chicken-pox	2	..	3	..	3	..	4	..	—	..	—	..
Others	1	..	2	..	2	..	1	..	—	..	—	..

TABLE III.—DEATH-RATES, PRINCIPAL COMPLICATIONS, ISOLATION PERIODS, AND INFECTIVITY AFTER DISCHARGE FROM HOSPITAL. (1933, 1934, 1935: 4916 CASES.)

Series, cases, and average isolation period.	Principal complications, &c.	Per cent. in series.	0–5 years.			5–10 years.			Over 10 years.		
			Group total.	Cases.	Per cent.	Group total.	Cases.	Per cent.	Group total.	Cases.	Per cent.
Intravenous, 2428 cases, 18·2 days.	Deaths.	0·16	612	Nil.	Nil.	984	1	0·1	832	3	0·4
	Otitis.	1·9		24	3·9		19	1·9		5	0·6
	Nephritis.	0·2		2	0·3		2	0·2		1	0·1
	Infecting cases.	3·5		15	2·4		51	5·2		19	2·3
Intraperitoneal, 733 cases, 21·2 days.	Deaths.	Nil.	252	Nil.	Nil.	294	Nil.	Nil.	187	Nil.	Nil.
	Otitis.	2·0		10	4·0		5	1·7		Nil.	Nil.
	Nephritis.	0·1		1	0·4		Nil.	Nil.		Nil.	Nil.
	Infecting cases.	3·4		5	2·0		16	5·4		4	2·1
Intramuscular, 282 cases, 30 days (approx.).	Deaths.	1·4	161	3	1·8	85	Nil.	Nil.	36	1	2·8
	Otitis.	8·1		18	11·2		5	5·9		Nil.	Nil.
	Nephritis.	1·1		2	1·2		Nil.	Nil.		1	2·8
	Infecting cases.	2·1		2	1·2		4	4·7		Nil.	Nil.
Non-serum, 1473 cases, 33·9 days.	Deaths.	0·8	574	5	0·9	524	4	0·8	375	3	0·8
	Otitis.	7·1		67	11·7		31	5·9		6	1·6
	Nephritis.	1·7		12	2·1		8	1·5		5	1·3
	Infecting cases.	2·9		16	2·8		16	3·0		11	3·0

of the bed-cards in view of this remark, it was found that the proportion of exceptions amounted to less than 5 per cent. of the total. Table III.: "This table represents the accumulated experience during the years 1933–35 of the fatality, and the incidence of the complications, otitis and nephritis. The necessary tests of significance were made and the results are as follows:—

TABLE III.A.—*Incidence of Complications*

—	Otitis (per cent.)			Nephritis (per cent.)	
Age ..	0–5	5–10	Over 10	0–5	5–10
I.V.	3·9	1·9	0·6	0·33	0·20
N.S.	11·7	5·9	1·6	2·09	1·53
Difference =	7·8	4·0	1·0	1·76	1·33
S.E. of diff. =	1·52	0·95	0·54	0·595	0·393
	5·12	4·2	1·8	2·96	3·38
I.P.	4·0	1·7	0	0·40	0
N.S.	11·7	5·9	1·6	2·09	1·53
Difference =	7·7	4·23	1·6	1·69	1·53
S.E. of diff. =	1·98	1·28	0·783	0·774	0·529
	3·89	3·3	2·04	2·19	2·89
I.M.	11·2	5·9	0	1·24	0
N.S.	11·7	5·9	1·6	2·09	1·53
Difference =	0·5	0	1·6	0·85	1·53
S.E. of diff. =	2·34	2·06	1·53	0·913	0·849
	0·214	0	1·05	0·93	1·80

TABLE III.B.—*Case-fatality (all Deaths)*

I.V.	0·16	I.P. ..	0	I.M. ..	1·40
N.S.	0·80	N.S. ..	0·80	N.S. ..	0·80
Difference =	0·64		0·80		0·60
S.E. of diff. =	0·211		0·289		0·415
	3·03		2·77		1·45
I.V.	0·16	I.V. ..	0·16	I.P. ..	0
I.P.	0	I.M. ..	1·40	I.M. ..	1·40
Difference =	0·16		1·24		1·40
S.E. of diff. =	0·202		0·301		0·336
	0·79		4·12		4·17

I.V. = intravenous; N.S. = non-serum; I.P. = intraperitoneal; I.M. = intramuscular. S.E. of diff. = standard error of difference.

Briefly the results show that intravenous injection is very effective as compared with non-serum or controls. The intraperitoneal series is likewise better than the non-serum. The results for the intramuscular series are worse than those for i.v. or i.p. In point of fact they do not differ from those for the 'untreated' children. This, however, does not involve a condemnation of the intramuscular method. The children who had injection in this manner were, for all practical purposes, a select population."

OTHER CONDITIONS OF THE INVESTIGATION

Dosage of antitoxin.—A single dose of 10 c.cm. for a child (20 c.cm. in septic cases) and 10, 15, or 20 c.cm. for an adult, according to the severity, was found to be sufficient if given by the intravenous or intraperitoneal route. During the year 1935 a single 10 c.cm. dose was employed in 97 per cent. of cases under 10 years of age in both groups. At ages over 10 years, in the venous group, 73 per cent. had only 10 c.cm. serum and the remainder 15 or 20 c.cm. In the peritoneal group at these ages, 61 per cent. had 10 c.cm., 34 per cent. had 20 c.cm., and the remaining 5 per cent. had 15 c.cm.

Day of disease on which antitoxin was given.—In order to obtain such results as those shown in the tables, antitoxin should be given early—i.e., within the first three days of the disease. During 1935 85 and 86 per cent. respectively in the venous and peritoneal series were so treated, and for the first two days of the disease the figures were 48 and 56 per cent. respectively. Thus, on the whole, the intraperitoneal cases were treated slightly earlier than the intravenous.

Reactions.—These were discussed in former papers [1 2] in so far as the intravenous route is concerned. Subsequent experience has shown that certain batches of serum turned out by any given maker are unsuitable for intravenous injection on account of the dangerous immediate constitutional reactions produced. It has not been found possible to identify the noxious factor concerned in these batches. The serum used in this investigation was produced at the London County Council Belmont laboratory. Immediate reactions in the venous series were comparatively few, but this result was achieved by the exclusion of certain batches that were found to give reactions, some very dangerous, in as many as one-third of the cases injected. It is of interest to note that the excluded batches were found to be quite suitable for intraperitoneal use. When a suitable batch giving very few and slight reactions after intravenous injection was obtained a large supply of the batch was reserved exclusively for intravenous use. One such supply lasted for over 18 months. A method such as this is probably essential for intravenous injection of streptococcus antitoxin on a large scale. In this series of 2428 intravenous injections no fatality due to serum occurred, but it must be emphasised

that, in a few cases, the reaction was very severe with certain batches of serum. Constitutional reactions following intraperitoneal injection of serum were very rare and mild, not more than 2 or 3 occurring in the whole series. In this respect, the intraperitoneal route appears to resemble the intramuscular rather than the intravenous. It is, moreover, unassociated with the local discomfort, pain, and tenderness that may be such an objectionable feature of intramuscular injection. With one exception, intraperitoneal serum in this investigation was painless except for the needle prick through the skin and parietal peritoneum. The exception occurred in a trial of another maker's serum which was preserved with 0·5 per cent. phenol. This serum gave rise to abdominal pain, tenderness, and rigidity for a few hours in three out of four cases. It is possible that 0·5 per cent. phenol is an unsuitable preservative for serum which may be used intraperitoneally.

Technique of intravenous injection in young children has already been described.[1 2]

Technique of intraperitoneal injection.—This is simple. The requisites are a sterile syringe, a sterile needle, and an area of the skin of the abdomen thoroughly prepared with antiseptic. The needle should be fine, about 8/10 mm. bore, sharp, and with a short bevel about 2·5 mm. in length. The length of the needle commonly used is 1½ in., but for stout subjects 1¾ in. may be required. Convenient sites for injection are (1) in the middle line about one inch below the umbilicus (2) just beyond the outer border of either rectus muscle at a level of the umbilicus. With a sharp fine needle no local anæsthetic is required. In making the puncture the needle attached to the syringe is passed vertically downwards until the resistance of the parietal peritoneum is felt. A pause is then made until the patient relaxes intra-abdominal pressure, when the peritoneum is pierced with a short jabbing stroke and as quickly as possible a few drops of serum are expressed into the peritoneal cavity. The injection then proceeds at a convenient speed, the fluid being felt to flow from the syringe with little resistance. After the injection the foot of the bed is raised to facilitate absorption.

Ward environment.—With a few exceptions the venous and peritoneal cases were treated in serum wards in which every definite case of scarlet fever admitted in the acute stage had antitoxin treatment. This may be a factor which favours reduction of mass infection in the ward. It does not follow that similar results would be obtainable in wards in which a major proportion were non-serum cases.

Rapidity of absorption of antitoxin from the peritoneum.—Intraperitoneal antitoxin therapy is based upon the well-established fact that fluids injected intraperitoneally are absorbed into the blood stream with great rapidity. Although observations upon antitoxin absorption from the peritoneum are not numerous, the experiments of Platou [9] with diphtheria antitoxin appear to afford a basis for this therapy. "Within an hour of intraperitoneal injection," he states, "the blood is appreciably antitoxic and up to about seven hours the absorption is about five times that of intramuscular."

SUMMARY

1. A single dose of 10–20 c.cm. scarlatinal antitoxin injected intravenously or intraperitoneally within the first three days of onset considerably modifies the course of both simple and septic scarlet fever.

2. By this means, the average isolation period in hospital has been successfully reduced to about 2 weeks for adults and 3 weeks or less for children.

3. The application of this routine to all definite cases of scarlet fever admitted to hospital wards in the acute stage has been associated with a substantial and significant reduction of morbidity.

4. Thus, otitis media has been reduced to one-third and nephritis to less than one-seventh of the incidence in untreated controls.

5. The intraperitoneal route of injection of antitoxin *in this disease* has yielded results almost identical with those of intravenous.

6. Since the technique of intraperitoneal injection at all ages is simple, and danger from shock is negligible, with adequate aseptic safeguards the method is capable of wide practical application.

I have to acknowledge the helpful criticism received during the compilation of this paper from Dr. J. A. H. Brincker, and from the central staff of the Special Hospitals Division of the London County Council.

REFERENCES

1. Banks, H. S., and McKenzie, J. C. H.: THE LANCET, 1929, i., 381.
2. Banks: Jour. of Hyg., 1933, xxxiii., 282.
3. Gordon, J. E., and Badger, G. F.: Amer. Jour. Pub. Health, 1934, xxiv., 438.
4. Brown, W. A., and Allison, V. D.: Jour. of Hyg., 1935, xxxv., 283.
5. Gunn, W., and Griffith, F.: Ibid., 1928, xxviii., 250.
6. Greenwood, M.: Ministry of Health Rep. No. 35, 1927, p. 226.
7. Cameron, A. G. R.: Report re Return Cases of Scarlet Fever and Diphtheria to Metropolitan Asylums Board, 1905.
8. Goodall, E. W., Greenwood, and Russell, W. T.: Med. Research Council, Rep. No. 137, 1929, p. 25.
9. Platou, E. J.: Arch. Pediat., 1923, xl., 575.

Clinical and Laboratory Notes

CONGENITAL AND FAMILIAL ABSENCE OF HAIR FROM THE WHOLE SURFACE OF THE BODY

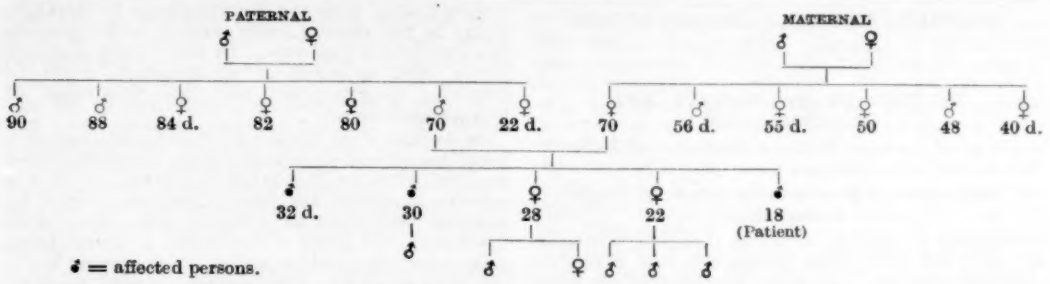
BY MIN SEIN, M.B. Calcutta, M.R.C.P. Lond.
CAPTAIN, I.M.S.; CIVIL SURGEON, TOUNGOO, BURMA

CONGENITAL and familial absence of hair from the whole surface of the body is extremely rare. The following case, seen by me whilst I was civil surgeon at Bhamo, deserves record.

The patient, a Punjab Mohammedan male aged 18 years, was a recruit to the Bhamo battalion of the Burma military police and appeared before me for medical examination in April, 1935. On routine examination it was noticed that he had no hair at all on the whole of his body surface. Inquiry elicited the fact that it was a congenital and familial condition as his two elder brothers were similarly affected. The family tree is tabulated below, with the age (or age at death) of the members; the details were obtained by him from India at my request.

A glance at this tree demonstrates the longevity of the brothers and sisters of the patient's father. The patient's second brother, who is similarly affected, has a son who is normal. The patient's two sisters and their five children are all normal. There is no consanguinity of the parents.

Physical examination did not reveal any other abnormality. The patient had fine physical development as the following measurements will show: height, 5 ft. 7½ in.; weight, 140 lb.; chest, 33 in. on expiration and 36 in. on inspiration. On the scalp the pits which normally represent the openings of hair follicles were absent and were replaced in several places by small papules at the summit of a few of which fine downy rudimentary hairs could be seen. A few of these were also present in the armpits. The eyebrows and eyelids were bare of hair giving the face a characteristic appearance. The pubic



region was also devoid of hair. The patient's reactions to heat and cold appeared to be normal and he perspired freely. Examination of the central nervous system was negative. No endocrine disorder was demonstrable.

COMMENT

The development of the hair is quite simple. It originates as a thickening by proliferation of the cells of the epidermis. This grows downwards as a solid bud into the corium where it expands to form the hair bulb, being moulded over a papilla of condensed mesoderm in the form of an inverted Y. Whilst this is going on there is a differentiation of the cells of the bud into a core of polygonal cells surrounded by an outer stratum of columnar cells. This represents the hair follicle. The cells of the hair bulb also proliferate and finally develop into the shaft of hair and its inner sheath. The hair lengthens by growth at the hair bulb. That there was an attempt to produce hairs is apparent from the presence of rudimentary hairs. Whether the attempt was unsuccessful because of the non-canalisation of the hair follicles or the inability of the hair bulb to form hair is mere speculation. No explanation could be offered for the abnormality except the unsatisfactory implication that the condition was a hereditary and congenital "ectodermal defect" which had stopped the full development of the hairs.

EXTRACTION OF MALE HORMONE FROM URINE FOR BIOLOGICAL ASSAY

By R. K. Callow, D.Phil.

(*From the National Institute for Medical Research, London, N.W.*)

In spite of the interest attaching to the amount of male hormone excreted in the urine in certain clinical conditions, no comparative study has been published of methods for complete extraction of male hormone from urine under laboratory conditions for purposes of biological assay, and there is actually no generally accepted standard method. At the National Institute for Medical Research an extensive comparison has recently been made of a number of methods of extraction and systematic variations of them. This work will be reported in full elsewhere, but it has been thought useful to publish details of a method which has so far given the highest yield of male hormone from normal male or female urine, in the hope that it may be tested by other workers and modified, if necessary, in the light of wider experience.

Only a small amount of male hormone is extracted by benzene from normal urine which has not been heated with acid; the male hormone, like œstrone and œstriol in pregnancy urine, is thus excreted largely in an esterified form which requires hydrolysis by vigorous acid treatment in order to convert it into a biologically active form. On the other hand, the hormone is destroyed when too drastic conditions of hydrolysis are employed. The following procedure is the one which has been adopted as a provisional routine method in this laboratory.

In order to obtain a result which is correct within ± 20 per cent. it is necessary to take a three-litre sample of an average urine for extraction so as to allow for administration of a total dose of extract equivalent to half a litre of urine per bird in a group of five capons. It is important that the urine should be kept fresh, it is preferably stored at 0° C. after collection, without preservative. The proportion of concentrated hydrochloric acid required to bring the urine to pH 1 is determined with a 100 ml. portion; with a fresh urine about 20 ml. per litre is necessary. Methyl-violet is used as indicator, the colour produced by the urine mixed with an equal volume of the indicator solution being compared with that produced by decinormal hydrochloric acid (the Capillator technique is convenient). The whole sample is then rendered strongly acid (pH below 1) by the addition of sufficient hydrochloric acid to bring it to pH 1, plus 20 ml. per litre in excess.

The mixture is placed in a flask fitted with a reflux condenser and a tube from the top of the condenser leading to an arrangement for absorbing fumes in alkali, and is then brought to the boil within ½–1 hour and boiled for 1 hour. It is then transferred to a continuous extraction apparatus and extracted with benzene for 20–24 hours. The benzene solution (500 ml.) is freed from acid by extracting twice with 50 ml. portions of saturated sodium bicarbonate solution, freed from phenols by extracting twice with 50 ml. portions of 2 *N* sodium hydroxide, and washed with water. The benzene solution is evaporated to dryness and the residue is extracted four or five times with 10 ml. portions of redistilled ether. The ethereal extracts are filtered through a coarse sintered-glass filter, and the filtrate is evaporated bit by bit in a small, weighed, flat-bottomed tube. Sufficient arachis oil is added from a syringe to the residue (100–300 mg.) to make the volume up to 3 ml., and the mixture is heated and stirred until all the oil-soluble material has dissolved.

This solution, containing the equivalent of 1 litre of urine in 1 ml., provides for daily injections of 0·1 ml. per bird in a group of five capons over a period of five days in the usual method of assay, giving, with a normal urine, an easily measurable response.

The yield of male hormone obtained in this way from pooled samples of normal female and male urine has amounted, respectively, to 29 and 26 international units of male hormone activity per litre (equivalent to 2·9 and 2·6 mg. of androsterone per litre).

I am greatly indebted to Prof. Winifred C. Cullis, of the London School of Medicine for Women, and to Dr. P. N. Panton, of the London Hospital, for arranging the collection of pooled specimens of normal urine from medical students. The biological assays were carried out by Dr. A. W. Greenwood and Miss J. S. S. Blyth at the Institute of Animal Genetics, Edinburgh. I am grateful to Dr. A. S. Parkes, F.R.S., for his critical interest and discussion in the course of the investigation which led to this method.

BRITISH MEDICAL ASSOCIATION

MEETING AT OXFORD

SECTION OF PATHOLOGY AND BACTERIOLOGY

Dr. E. W. AINLEY WALKER (Oxford) presided over this section and a discussion on

Disorders of Hæmopoiesis due to Toxic Substances

was opened by Prof. L. J. WITTS (London), who said he proposed to discuss particularly the effect of therapeutic drugs. He began by pointing out that the amount of any drug that will prove poisonous to animals or patients is variable. The range of variation is small with certain poisons such as digitalis, but large with others such as the barbiturates. The same variability is seen in the reaction of different individuals: thus Dudley found that of 30 men exposed to arsine gas, one was not affected, seven had severe anæmia, while others had symptoms of anoxæmia only. The toxic effect of a drug might be due (1) to an increased susceptibility, the symptoms being those of over-dosage, or (2) to idiosyncrasy, the symptoms being entirely different from those of overdosage and not reproducible in animals. Susceptibility shaded into tolerance and insusceptibility; idiosyncrasy on the other hand was sharply demarcated. Prof. Witts illustrated the differences between susceptibility and idiosyncrasy by reference to amidopyrine. The usual symptoms of overdosage with amidopyrine were sleepiness passing into stupor, hyperpnœa, tachycardia, sweating, and collapse; whereas the symptoms dependent upon an idiosyncrasy were pyrexia and rapid onset of agranulocytosis. A study of coroners' reports on cases of suspected poisoning with amidopyrine, suggested, he thought, that the importance of idiosyncrasy is not sufficiently realised. He feared there was usually a latent period of at least ten years before the toxic properties of any new drug were appreciated. The hæmotoxic properties of gold, which had been in use now for ten years, had, for instance, only recently been recognised. These properties were, he believed, due to the gold itself and not to the sulphur or benzene ring also present in the preparations employed. The hæmotoxic accidents of gold therapy followed small doses only and were not accompanied by the ordinary symptoms of gold poisoning. He quoted figures to show that in half the patients who develop a blood dyscrasia the dose has been less than 2·0 grammes and in three-quarters less than 4·0 g.

Discussing the nature of the idiosyncratic reaction to drugs Prof. Witts said it probably had no ætiological relationship to the toxic idiopathies or asthma-eczema-migraine group of diseases. The occurrence of agranulocytosis in different members of the same family suggested a hereditary liability, while the idea of a constitutional predisposition was supported by the occurrence of different types of blood dyscrasia in the same patient after different drugs. He also spoke of the possible effects of local predisposition and the disease for which therapy is given. In some cases there was a mechanism which he considered akin to anaphylaxis, since an initial sensitising dose appeared necessary. Both the abrupt fall in white cells when amidopyrine is ingested by the sensitive person, and the allergic type of reaction in the thrombopenic purpuras due to drugs, he regarded as comparable to blood dyscrasias occurring in people with food allergy. From a medico-legal point of view it had to be recognised that time may be required after exposure for symptoms to develop; injury to the marrow, once started, might progress without further exposure. In some cases a second factor, such as sepsis or menstruation, might be necessary to precipitate the final catastrophe of hæmotoxic collapse.

In the past, Prof. Witts held, classification had been based too closely on changes in the peripheral blood and too little on the marrow picture. It was a mistake to regard the blood dyscrasias caused by chemical substances as different from other blood dyscrasias. He found it convenient to divide blood poisons into those which act on the peripheral blood and those which act on the marrow. Arsine, tolulenediamine, and lead he grouped as the most important hæmolytic agents, while the aniline compounds were the most important of the hæmotoxic. Reactions of the marrow could be classified under the following heads: (1) regenerative hyperplasia; (2) dysplasia, in which the marrow is cellular, but the ripening of the cells is imperfect and few are delivered into the circulation; (3) neoplasia or leukæmia; and (4) aplasia. In the dysplastic marrow he had found the number and proportion of the different cells the same as in health, but varying degrees of degeneration had been present according to the severity of the lesion and freshness of material. The acute effect of benzol (benzene) and its derivatives, and of nirvanol, thorium dioxide, and gold, he placed in this group. After an acute attack, if the patient survived, the marrow usually recovered, but sometimes there might be lasting paralysis though the cellular character appeared normal. Any of the poisons which produce aplasia of the marrow could also, the speaker believed, arrest maturation without actual necrosis or aplasia. Usually in dysplasia all the cellular elements were equally affected, but he described how in agranulocytosis due to amidopyrine the myeloid element is involved, in thrombocytopenic purpura there is an increased number of megakaryocytes, while in the anæmia of radium poisoning the immature erythroblasts are affected. The possibility of neoplasia or leukæmia resulting from a hæmotoxic reaction he considered important and instanced certain cases of leukæmia following benzol poisoning or exposure to X rays. Aplasia of the marrow following overwhelming intoxication with benzol, mercury, sulphur, gold, radium, and X rays he mentioned briefly. Finally he suggested that the part of pathology he had been dealing with was top-heavy with terminology and under-ballasted with facts. It was important, not only for hæmatology, but for students of the whole problem of idiosyncrasy, that more histological data should be obtained both from serial biopsies and from autopsy material.

Dr. J. C. BRIDGE (London) spoke of his experience of blood dyscrasias as a factory inspector. The first seven cases of benzol poisoning he had described in 1918 were all exposed to the same risk, but only two were fatal, which brought out the importance of individual susceptibility. The toxicity of solvents was still an unknown field of knowledge, but he thought Prof. Witts unduly gloomy in his belief that ten years was the latent period required to assess the danger of an industrial hazard. Benzol poisoning had been made notifiable in 1926, since when only seven cases had been notified, with five deaths. A study of this small group suggested there was no peculiar age or sex incidence. Dr. Sibyl Horner had examined the blood of a group of workers in contact with benzol over a number of years: a blood count of 4,800,000 per c.mm. had been found in 52·4 per cent., a count between 3,000,000 and

4,800,000 in 45·2 per cent., and a count of over 5,000,000 in 2·4 per cent. The appearance of the red cells was normal in 68 per cent. There was no leucopenia in 77·4 per cent. The few workers exposed to radio-active substances in this country had been found to show no anæmia. Dr. Bridge remembered two cases of leukæmia that had been brought to his notice but he had not been able to find any relationship to benzol poisoning. He thought that the so-called late effects of lead poisoning were often of doubtful origin and might be due to other causes.

Dr. L. E. H. WHITBY (London) spoke of the effects of X rays and radium on those employed in radiological departments. His conclusions were based on observations made over a ten-year period at the Middlesex Hospital where lately there had been 50 people working with X rays and 10 with radium. Complete blood counts had been made on these workers every three months and latterly there had also been a control count made before any exposure. He had seen one case of acute leukæmia in a medical man who had worked with X rays before strict protection was adopted. He regarded a total white count below 5000 with a neutrophil granulocyte count below 3000 per c.mm. as a danger sign, and described three types of reaction. As an example of the first type he mentioned a woman who had a normal picture for a relatively long period after which her count started to fall; the fall was not immediately appreciated and she did not leave work for some time, with the result that recovery took several months. In the second group he described the case of a man who having worked with X rays for a long time developed a leucopenia at once when transferred to manipulation of a large radium bomb, he was immediately sent away and recovered rapidly. In the third group Dr. Whitby placed people who on first examination had a low white count and who had been shown by experience to be unsuitable for X ray work. His experience had been that radium was more dangerous than X rays. Of the three workers in X rays who had developed leucopenia two had been in the deep X ray therapy department.

Dr. JANET VAUGHAN (London) discussed the disorders of hæmopoiesis due to toxic substances produced to a large extent within the body—i.e., the dyscrasias associated with sepsis and azotæmia. It was often stated that the anæmia of sepsis was dependent upon marrow aplasia, but such reports as she had been able to trace suggested rather that there was a hyperplasia of erythropoietic tissue. She wondered therefore whether sepsis might not be associated with arrest of maturation in the marrow. There was no evidence that sepsis increased blood destruction except in rare conditions like *Bacillus welchii* infections or Oroya fever. The available evidence indicated that it inhibited erythropoiesis. In support of this Dr. Vaughan quoted the well-known clinical fact that hæmopoietic principles lose their therapeutic effect in the face of sepsis, and the observations of Fairley that removal of the parasites alone in the anæmia of malaria suffices to promote blood production. Experimental observations of Robscheit-Robbins and Whipple had, she thought, shown that this inhibitory action of sepsis is exerted rather on the internal metabolism of hæmoglobin than upon peripheral blood or marrow. Whether the changes in the marrow in agranulocytosis of sepsis are similar to those in amidopyrine poisoning appeared questionable. Probably in sepsis myeloid degeneration was greater, while in amidopyrine poisoning lymphocytic proliferation seemed to be characteristic. Certain cases of thrombocytopenic purpura she described as due to sepsis. Turning to the anæmia associated with azotæmia, she described five cases in which, irrespective of the total red cell count, there was a reticulocytosis. Three of these at autopsy had proved to have hypoplasia of the marrow. She pleaded for complete skeletal examination in all disorders of hæmopoiesis at autopsy.

Dr. S. C. DYKE (Wolverhampton) instanced the discovery of amidopyrine as an ætiological factor in the development of agranulocytosis as an example of the value of the deductive method in medicine. In 1922 Schultz had first described cases of agranulocytosis. It had subsequently been noted to be more common in America, Germany, and Denmark than elsewhere and to have a particular affinity for medical men and their families. These peculiar facts had made independent observers suspect the sample drug traffic and had led to the incrimination of amidopyrine. He considered that elderly people were most commonly affected, especially women after the menopause, and he thought some change in the balance of the sex hormones was partly responsible for the disease. He did not believe the benzene ring to be the toxic agent in amidopyrine, since both aspirin and phenacetin contain a benzene ring but do not cause agranulocytosis. He discussed the possible chemical nature of the toxic agent at some length.

Prof. D. F. CAPPELL (Dundee) emphasised the importance of idiosyncrasy in all toxic reactions. It was, he thought, insufficiently appreciated by medico-legal experts.—Dr. J. V. DUHIG (Brisbane) described his observations on employees on a large lead-mining and smelting plant. He had found in addition to classical plumbism two curious types of response: (1) a rapid and severe intoxication indicating special susceptibility or idiosyncrasy, and (2) a permanent and incurable secondary anæmia. He was prepared to accept long delayed lead poisoning only with great reserve.—The PRESIDENT spoke of the advantage of judging the effects of any drug in relation to surface area rather than to the weight of the experimental animal or patient. In assessing the toxicity of diphtheria toxin for guinea-pigs, it had been found that there was no individual variation in susceptibility when the dose was regulated by surface area and not by body-weight.—Dr. R. E. LANE (Manchester) suggested that in lead poisoning at least there was possibly a familial idiosyncrasy; he had seen three brothers affected. He was sceptical about delayed lead poisoning. The patient whose case had been reported by Waterfield was afterwards found to have been ingesting large quantities of lead at the time of observation.—Prof. W. CAMPBELL (Cape Town) said that in his experience agranulocytosis did not occur among South African natives. He had been unable to reproduce the condition in animals by injection of organisms from fatal cases.—Colonel F. P. MACKIE (London) emphasised the need for further knowledge of the normal distribution of marrow in the skeleton. He drew attention to the occurrence of agranulocytosis in patients with trypanosomiasis.

In reply to questions, Dr. WHITBY said he had seen one case of an X ray worker who had developed leucopenia, gone off on leave, and on return had maintained a satisfactory count. Patients with a primary leucopenia were advised not to start work in the department.—Prof. WITTS described his technique of bone-marrow puncture and quoted Colonel L. E. Napier as saying that pentose nucleotide is valueless in the treatment of the leucopenia of kala-azar.

SECTION OF PHYSICAL MEDICINE

THE meeting of this section on July 24th, with Dr. W. J. TURRELL (Oxford) in the chair, began with a discussion on

Ultra-high Frequency

Dr. PHILIPPE BAUWENS (London), in giving the opening paper, said that a short-wave therapy aimed at making selected tissues of the body the seat of electrical oscillations of very high frequency. To attain this the tissues were included in an oscillating circuit in which, subsequently, conditions required to bring about resonance with a high-frequency generator were satisfied. He then considered the various parts of the resonating circuit of a short-wave machine. Tissues could be subjected to high-frequency oscillations by inserting them between the plates of the condenser of the resonating circuit and tuning in by means of a variable inductance. This method was used in certain machines, but disadvantages inherent in variable inductances were likely to appear. More often the machine had two leads; the therapeutic use of such circuits required the recognition of its characteristics; the maximum potential difference was obtained if these leads were in length one quarter of the wave-length. As the highest possible electromotive force should be applied to the patient, particularly when using small electrodes, the length of the lead should bear this relation to the wave-length. In an apparatus so constructed the electromotive force measured across the plates of the variable condenser was directly proportional to the current developed in the patient's condenser when the latter was across high-tension nodes. By using this fact it was possible for the current in the condenser field to be estimated by direct reading. When the condenser field incorporated a load in the shape of living tissue it was the most important and the most perplexing component in the resonating circuit. The high dielectric constant of the tissue fluids bestowed on them the property of increasing the capacity of the field into which they were introduced, and of causing distortion, more especially when the space between electrodes and tissues was small. A heterogeneous dielectric, such as a tissue, produced an uneven field distribution, and so mechanical stresses varying with field density. Mechanical strains were bound to occur at high frequency when tissues were submitted to short-wave therapy. Dr. Bauwens postulated that this irritative process of strains produced at high frequency was responsible for lowering the threshold at which defensive tissue reactions took place; there was in deep tissues an effect similar to that termed "esophylaxis," which resulted from the "insulting" effects of ultra-violet irradiation on the skin. These uneven stresses should not be visualised as causing coarse cellular movement, but rather as producing fine vibrations of smaller particles in various histological structures, calling forth non-specific defensive reactions. He considered that although this effect probably invested ultra-short-wave therapy with its advantage over diathermy, the thermal component of the treatment should not be overlooked. Since a rise in temperature would cause an acceleration of pathological as well as of defence processes, in a large number of conditions better results were obtained in fields capable of producing only minimal or no rise in the temperature. Short-wave therapy was a therapeutic agent capable, primarily, of making tissues react against antigens, and, secondarily, of causing local pyrexia, thus accelerating biochemical activity. It was important to decide in each case whether the therapy was to be used for its heating or for its effect in initiating reactions. When used for the second purpose very great care in administration was required to avoid deterioration in the patient's condition.

Dr. JUSTINA WILSON (London) said that depth effect and directability were two most important aspects of short-wave therapy. The depth effect depended largely on the distance of the electrodes and the air spacing. This had been explained in terms of diverging lines of force. In the treatment of the chest and abdomen, depth effect was of paramount importance. Given an apparatus of constant output and wave-length the best effect was produced by making the skin area as large as possible. Layers of gamgee tissue, paper, clothing, felt or rubber between the electrode and the patient all reduced the depth effect. There was, she said, a certain amount of clinical evidence that the wave-length had a selective action. For instance, she had had a man and a woman patient with bronchial asthma, both having attacks by night and day. Neither had responded at all to 30, 12, or 6 m. wave-lengths nor to mild fever therapy (1° F. rise for one hour). When treated with a wave-length of 4·5 m. to the base of the brain, neck, and back they had cleared up, the woman's recovery being dramatic. For gynæcological cases short-wave diathermy was infinitely safer than ordinary diathermy, for it was good in acute cases, though risky in subacute ones. She had seen good results with it in gonococcal infections of the adnexa, in parametritis, and mastitis.

Dr. G. COOPER mentioned how the ease of application and simplicity of control of the short-wave therapy had led people to imagine that it could be applied without care or knowledge; that was the reverse of the truth. Experience had shown that results were uneven. The age of the patient, the dose and the time between applications were among the factors to be considered. He thought the therapy might be most effective when combined with other forms of treatment such as X rays and vaccines; in combination with X rays it had appeared successful in arthritis.

Dr. KERR RUSSELL (London) had treated several cases of sinusitis with short-wave therapy and had found it especially effective for infections of ethmoidal cells. They improved sometimes as late as six weeks after treatment; the patients should return when they caught a cold, since in the congestive stage the cold could be dispelled. One case of osteomyelitis seemed to have benefited. Of the 16 post-encephalitics treated 2 had apparently been uninfluenced; the others showed varying degrees of improvement in salivation, spasticity, tremor, eye symptoms, and sleeplessness. He had also had good results with cases of chronic osteo-arthritis but he had seen absolutely no improvement in those of otosclerosis. He considered the chief indications for short-wave therapy included general paralysis, parkinsonism, chronic infective arthritis, disseminated sclerosis, asthma and, above all, gonococcal infection.

Prof. E. WEISSENBURG (Vienna) reported his experiences of treating certain painful conditions. He had found that patients with neuritis were often adversely affected by ordinary full treatment but had responded favourably when the intensity of the short-wave diathermy was directed to the affected part only, and had been such as to produce no rise of temperature. With similar limited doses relief was also obtained in neurosyphilis, bronchitis, and

pneumonia with a hard cough. The pain of otitis media and of sinusitis could be diminished by low intensity treatment. Neuralgia, neuritis, migraine, angina pectoris, spastic colon, and dysmenorrhœa also responded to the treatment. He thought that the action of the therapy bore some resemblance to that of atropine and other alkaloids. The rise of temperature was so weak that the results could not be attributed to it; they were apparently attributable to a specific and calming effect on the trophic nervous system. He had tried many experiments which had shown him that these effects of low intensity treatment could not be due to suggestion. He had obtained experimental evidence that the amplitude of a nerve's action current was reduced by ultra-short-wave therapy.

Prof. F. N. NAGELSCHMIDT (Manchester) thought that the distortion effects referred to by Dr. Bauwens might be utilised. In America simpler and cheaper means tended to replace short-wave therapy. Electrically heated blankets, although theoretically different in action, seemed to give the same results. He too had found that neuritis reacted badly to heat. He had been considering the distribution of lines of force in a condenser field and had concluded that when the electrodes were larger than a dielectric placed in the field, the lines of force were clustered into the dielectric. For these reasons he believed that to obtain depth effect the condenser plate should be larger than the part to be treated and should be placed at a distance from the skin.

The CHAIRMAN said that the frank confession of errors did much to clear away the confusion of thought which had surrounded the subject of short-wave therapy.

Dr. BAUWENS did not believe that short-wave therapy could have molecular or atomic effects such as ultra-violet might be expected to have. He had found the therapy successful in rhinological work, osteomyelitis, and in parkinsonism, but the unhappy condition of the parkinsonians who reverted to their former condition on cessation of treatment had driven him to stop treating them at all.

Dr. F. HOWARD HUMPHRIS (London) then read a paper on

Mild Radium Therapy

He said that treatment by radium emanation was also called mild radium therapy, radon therapy, and emanotherapy. It had been used empirically for ages, and scientifically for 30 or 40 years, yet it was little known in this country, although abroad it was now employed extensively in compresses, sprays, subcutaneous injections, baths, inhalations, and drinking water. It was used in 20 hospitals in Paris, and at a thousand clinics in Germany, in Italy, Czechoslovakia, Spain, Portugal, and the U.S.A., and he wished to see the therapy adopted by hospitals and spas in this country. He also wished to clear the widespread error that radon was dangerous. Radium and radium emanations were distinctly different, yet many people even in the profession still imputed the dangerous properties of radium to the emanation which, he said, could not possibly be dangerous. The legend of the dangers of radium emanation had arisen partly from confusing it with radium itself in interpreting the incident at a factory in New Jersey. Several girls occupied in painting luminous paint on to watch and clock hands had pointed their camel-hair brushes with their lips, had thus come to swallow small amounts of radium and its congener mesothorium, and had died ultimately of carcinoma. The other example so often quoted was of a gentleman of Pittsburg who for a considerable time drank a solution of radium and mesothorium thrice daily in an endeavour to rejuvenate himself and to improve his golf. He developed carcinoma and died. These cases had been due to radium or its salts and had nothing to do with mild radium therapy. Radium salts if ingested would leave deposits in the bones which would remain active for 1750 years; radium emanation was all gone in 3·85 days. His reference to the empirical use of emanotherapy had been to the "holy earth" which could be seen in the leather bags of Bohemia; they were the forerunners of the radium pad of to-day. Other examples of the value of emanation therapy occurred in history. The healing qualities of Bad Gastein were described a century ago; the waters were subsequently found to contain radio-active gas. Spas, more especially in Germany, had such names as "The spring of eternal youth," "The spring of rejuvenation and regeneration," "The spa for the ancients." In this country Bath stood almost alone in its radio-activity. Abroad the higher the radio-activity the more health giving the spring was reputed to be, and in a great measure spa treatment was mild radium treatment. Recently radon emanators had been constructed, capable of preparing active water with greater standardisation of dosage than was attained at spas.

The emanations were administered in drinking water, by subcutaneous injections, by rectal insufflations (used largely for gynæcological conditions), as a spray by means of blowing a gas through water containing the emanation, by radium pad, and by an expensive pomade. Inhalation was a method used by the Romans in their emanatoria; nowadays patients received an hour's treatment in a room into which the gas was pumped. The dosage was liable to be inaccurate as the emanation tended to gravitate to the floor.

Radium emanation therapy had been found beneficial in gout, in rheumatisms, in certain gynæcological conditions—notably pelvic pain and congestion, salpingitis, and sterility—in psoriasis, mycosis fungoides, and eczema, and in respiratory catarrh. He considered that its "revitalising" quality made it useful in convalescence and in the complaints of middle and old age. The therapy was believed to act theoretically by stimulating the metabolism and activating the oxidative processes.

Prof. SIDNEY RUSS (London) took "mild therapy" to mean a form of treatment in which the agent was used so that it could not possibly do harm. It was a question, he said, whether radium in mild doses could be useful in the treatment of disease. Much that had been written on the subject before was simply surmise and opinion. The radium in spa waters was supposed to have therapeutic value. Actually spa waters often contained radium or radon or both, but so did practically every river, lake, and ocean in the world. For some reason which he had found hard to understand, the minute traces—and they were always exceedingly minute—in spa waters had been put forward as a reason for some of the therapeutic value of the drinking water of the spa. If this were true the spa waters richest in these elements might reasonably be expected to be among the most noted, but they were not. Sweden had many spas, but their healing properties could scarcely be connected with their radio-activity, for the drinking water from artesian borings in the Stockholm granite was far more radio-active than that of any of the spas, information for which he was indebted to Prof. F. Soddy. If indeed the curative

value of spa waters was due to their radio-activity their value as health resorts might disappear very easily; for radium or radon impregnated water could be made at trifling cost. Calculation showed that an outlay of £240 would buy enough radium to activate 2,250,000 million litres daily to the strength of the K.W. Gas at Bath almost indefinitely.

Small quantities of radium were said to invigorate the body; the energy produced by the maximum amount of radium which a man might be assumed to tolerate in his body amounted to about a ten-millionth of the heat requirements of the body. The rationale of radon treatment had also been stated to be the promotion of oxidation; a typical oxidation process was the production of hydrogen peroxide from acidulated water, and this could be brought about by beta radiation from radium. In some quantitative experiments Mr. G. W. Spicer had found that the amount of hydrogen peroxide which would be produced by a litre of the K.W. Gas at Bath was one hundred millionth of a milligramme. This small quantity could not possibly have any effect on the metabolic processes of the body. An ordinary peroxide mouth wash would quite swamp any such therapy.

In the last four years Prof. Russ, working with Dr. Howitt, had tried to find out what physiological and biochemical changes might be induced in patients by such comparatively small doses of radon water as would be included under the term "weak doses." In a paper on the subject, which had just been completed, Dr. Howitt had concluded that in the systematic treatment of cases of rheumatism and allied affections no demonstrable change was found in their clinical condition during treatment, and that patients seen two years later did not ascribe any permanent amelioration of symptoms to the treatment. When dosage was pushed to much higher figures no improvement had been produced. There was, however, a tendency towards a fall in the erythrocyte count; with the occurrence of systemic damage there was no justification for treatment on such lines.

Dr. Humphris had said that radium emanation could not be dangerous. He himself had had experience of breathing radon in the war; he and his colleagues had had no doubt that the effect was deleterious.

Dr. F. D. HOWITT, speaking of his clinical investigation, concluded that in small doses emanation therapy was of no great value. In larger doses, even when very well controlled, it might be dangerous.

EXHIBITION BY COMBINED SECTIONS

ON July 23rd a large demonstration was given to a meeting of the sections of Physiology and Biochemistry, Pathology and Bacteriology, Anatomy, Pharmacology and Therapeutics with Anæsthetics. The principal exhibit, which was watched also by the section of obstetrics and gynæcology, was a film by Sir JOSEPH BARCROFT and Dr. H. BARRON (Cambridge) entitled

Origins of Movements in the Fœtus

The film had been taken during Sir Joseph's experiments, and for the most part showed close-ups of the fœtus lying on an observer's hand and connected by the umbilical cord to the placenta in the uterus. The audience was, however, also shown one more distant view of a ewe under spinal anæsthesia lying in a bath of warm saline, and accepting lumps of sugar while Cæsarean section was performed.

Sir Joseph explained that he and his collaborator had set out to investigate the earliest movements of which the sheep embryo was capable. The story of the development of the movements had been pieced together from observations on a series of ewes.

While at the thirty-sixth day, the earliest date at which they had elicited movement, the embryo had given single movements, a few days later the same stimulus (a poke on the nose) had caused the same movement to be repeated rhythmically. A little later still the embryo was found to be moving in the same rhythmical way without any particular stimulus and, indeed, as soon as the uterus was opened. At first the movement appeared to be extensor, but by the forty-first day it had become flexor in type. By the forty-sixth day the rhythm that had also involved the neck, limbs, and tail became confined to the trunk, and closely resembled normal inspiration. The rhythmic descent of the diaphragm was shown by the depression of the liver and the drawing in of the chest wall which at that stage was quite soft. No appreciable negative pressure was set up in the thorax.

Sir Joseph said that these observations seemed to throw light on the essential nature of respiratory rhythm. The explanations which had in the past been put forward had grouped themselves round three principal conceptions: (1) Each phase of respiration initiated a message to the brain checking that particular phase and initiating its opposite. (2) In the central nervous system there was a continual urge to inspire but the very act of inspiration set up sensory impulses which checked the effort, the lung then reverting passively to its unexpanded condition. (3) Respiration was due to rhythmic activity of the central nervous system. This last view was suggested by these observations of the sheep's fœtus and by the description by Adrian and Buytendijk of an inherent rhythm in the central nervous system of the goldfish with the same frequency as that of the gill movements.

Sir Joseph went on to describe how, when an asymmetrical stimulus had been given to a fœtus at about the thirty-eighth day, asymmetrical movement had resulted in and been followed by a symmetrical rhythmic movement. When the fœtus was on its side gravity seemed to be a component of tactile stimuli at about that stage, so that on stimulation the initial movement tended more and more to be one in which the crown of the head was directed upwards. In fact, by the forty-seventh day if the fœtus was tapped vigorously on either the snout or the tail it made a movement suggesting an effort to get up, followed of course by the rhythm. On subsequent days this aspect of activity became accentuated till, about the fiftieth day, the movement produced by tapping the fœtus closely resembled that often made when a new-born lamb rises from the ground. About the forty-ninth day the fœtus was so lively that it was difficult to manipulate it at all without consequent slight movements taking place, each followed by a rhythm. The result was that rhythmic movement scarcely ceased and the fœtus presented the general appearance of an ordinary animal breathing naturally. But when energetic movement took place as the result of a considerable stimulus the rhythm quickened and deepened, giving the appearance of an animal out of breath as the result of the effort it had made.

It had been shown conclusively that in human beings a quickening and deepening of respiration occurred immediately on effort, and it had been concluded that the ventilation was produced by radiation of impulses from the motor cortex. Sir Joseph considered that that radiation rather than any chemical mechanism appeared to be the fundamental regulatory mechanism. After the fiftieth

day the reflexes became more difficult to elicit, but the fœtus could be made to behave as if it were rather younger by inducing an appropriate degree of asphyxia. Up to the forty-ninth day pinching of the umbilical cord had no other effect than to slow the heart and kill the fœtus.

Sir Joseph said that a controversy had arisen round the subject of the initiation of mammalian movement. One view maintained that ordinary movements had individualised out of a general mass movement, the other that they had started in a localised way and become integrated into more generalised manifestations. The two conceptions had been assumed to be alternatives, but to him they seemed to represent successive stages in development, at least in the sheep.

Prof. H. BECKWITH WHITEHOUSE, who had taken the chair during the showing of the film, considered that movements, similar to those that the film had shown, might account for the claims some women made of feeling movements before the established date.—To this Sir JOSEPH replied that in the early stages of pregnancy the fœtus was so free in liquor that its movements were usually unlikely to be perceptible to the mother.

Dr. J. C. WINDEYER (Sydney) said that he had observed continuous and apparently purposive movements in anencephalic infants.—Sir JOSEPH said that in one experiment cutting off the cerebrum had had no effect on the fœtal movements, but when the medulla was removed by a second cut the fœtus apparently started running away.

Prof. FARQUHAR MURRAY (Newcastle) considered that towards term a fœtus began to have some sort of character.

Prof. W. H. WILSON (Cairo) asked whether the rhythmic movement was kept up independently of muscular tone and whether it was inherent.—Sir JOSEPH replied that it appeared to be inherent.

Embryology

One group of exhibits was concerned with widely different problems of development. Mr. JOSEPH NEEDHAM, Sc.D. (Cambridge), showed photomicrographs of embryonic epidermal tissue, which had been caused to differentiate into neural tube tissue by the introduction of crude glycogen. Some light was shed on the nature of the substance causing this organised phenomenon by the fact that the result was still produced though the crude glycogen had been boiled—thus excluding any vitalistic explanation—or subjected to saponification. It was not produced by pure glycogen.

An inherited skeletal anomaly which had arisen presumably by mutation in a previously healthy stock of mice was shown by Dr. HANS GRÜNEBERG (London). The lesions appeared to be essentially a failure of resorption of bone both in the cartilaginous and membranous bones. In the skull and elsewhere the bones were deformed and the marrow cavity of the long bones was non-existent. In addition calcification was imperfect and the teeth failed to erupt. The affected mice died on weaning, apparently of starvation. At first this had been thought to be due to the lack of teeth, but attempts to keep the animals alive on a liquid diet had failed. The incidence of the condition tallied completely with that to be expected from a Mendelian recessive character. In all, over 300 cases had occurred and the lesion had been unvarying in them.

Structures resembling the carotid body but related to the aorta and pulmonary arteries, that is to say the fourth and sixth branchial arch arteries, were demonstrated in sections of embryos by Dr. J. D. BOYD (Cambridge). The structures were related to the vagus nerve, the aortic bodies being supplied by branches of the depressor nerve. They persisted in the adult and were presumably chemoreceptors.

Dr. P. N. B. ODGERS (Oxford) showed an early human embryo.—Drs. KATHERINE TANSLEY, F. G. SPEAR, and A. GLÜCKSMANN demonstrated the effect of radium in the developing retina.—Dr. JOHN KIRK showed a series of photographs concerning the gubernaculum and the descent of the testis.

Experimental Physiology

Prof. T. NICOL (London) gave a demonstration of his researches into hormone influences on the endometrium shown by intra-vitam staining. Dye when injected into a guinea-pig was taken up by endothelial cells in the uterine tissues in different amounts at different phases of uterine activity. From such experiments he deduced that œstrin acted on the endometrium by stimulating the reticulo-endothelial cells. The corpus luteum hormone influenced the production of fat, especially in the uterine epithelium, but only in a uterus previously sensitised by œstrin as in the normal luteal phase of the cycle. The fat was presumably for the nourishment of an early ovum, and he thought that a deficiency of that hormone might often be the cause of death of a young embryo. Sections during early stages of pregnancy showed a fatty substance abundant in the endometrium. This food material appeared to be taken up by the yolk sac wall in the period before the placenta was fully formed. There was, however, no destruction of the capillaries coursing through it, and the solution of the endometrium must have been due to some agent such as an enzyme. In the guinea-pig there was no definite evidence that any fœtal elements persisted capable of producing such an enzyme. Prof. Nicol concluded that the changes might be initiated and directed from the ovary.

Mr. R. M. RANSON and Mr. J. TYNEN showed a method of estimating the relative spermicidal powers of many chemicals used in contraception.

Prof. H. H. WOOLLARD (London) gave a demonstration of the peripheral nerve-endings in human skin. The exact position of the different types of nerve-endings had been mapped out in an area. The skin had been removed, sectioned, and photographed, and the series of photographs pieced together, like an aerial map, to show the course of the nerve-fibres and their endings. Each sensation had been found to have its own specific type of ending and each ending its own fibre. The different types of ending had already been described to the section of anatomy. The demonstration included the scar on the arm from which the skin had been removed.

Dr. J. C. ECCLES and Mr. J. W. MAGLADERY (Oxford) showed records of electrical response and contractions of smooth muscle. These showed that when the nerve to the muscle was stimulated the action current and the contraction rose in regular increments over a considerable period of time. These suggested that the contraction of smooth muscle was of the nature of a tetanus, the augmenting contraction being caused by repeated and increasing chemical stimuli fired off initially by the nerve.

Dr. H. M. CARLETON and Dr. E. G. T. LIDDELL (Oxford) demonstrated a surgical procedure to bring a cat's external carotid to the exterior. They also showed a cat which had been operated on some

years ago and on which they had been studying changes in blood pressure. They had found that in the cat the blood pressure rose on a milk diet and went down if the cat lived on meat. The pressure also went up very rapidly from emotional causes, such as attention from some people, the sound of rustling paper or, most of all, the sight of a mouse.

Clinical Apparatus

Three exhibits were of methods of administering oxygen. Each had a very large cylinder of oxygen, some means of judging the flow of gas, some tubing, and a device for delivering the gas to the patient. Dr. E. P. POULTON showed the freedom permitted to the patient, and the control of atmospheric conditions, in his type of oxygen tent.—Dr. H. L. MARRIOTT'S and Dr. KENNETH ROBSON'S apparatus, by including a special device for measuring the flow and by delivering the oxygen to the patient by two nasal catheters, permitted the delivery of oxygen to be correctly gauged. It also allowed the patient to read and to move about.—The third exhibit, by Prof. J. ARGYLL CAMPBELL, was of two portable box masks: one was of light metal and the other—the original—a cardboard box cut up. The demonstration although mainly concerned with the method's efficiency also showed how easily this type might be constructed in an emergency.—Dr. MARRIOTT and Dr. A. KEKWICK showed continuous-drip blood transfusion being given. The Bragg-Paul pulsator for maintaining prolonged artificial respiration, shown by Dr. PHYLLIS KERRIDGE, was of interest because it was being tried out in poliomyelitis and diphtheria in some institutions.

Nutrition

A series of exhibits were concerned with the vitamin-B complex. Mr. J. R. O'BRIEN (Oxford) exhibited two rats with dermatitis (an erythema of the paws, ears, and snout) due to lack of vitamin B_6. The symptoms were curable by a diet of fish and cereals as well as by yeast and ox liver. Their relation to human pellagra was still obscure. It was explained that vitamin B_6 together with octoflavin constituted the original vitamin B_2.

Two methods of estimating vitamin B_1 were shown. Schopfer's test, which assayed vitamin B_1 by the growth of a mould on a special medium, had been utilised by Dr. A. P. Meiklejohn (Oxford) to test the vitamin-B_1 content of blood. The ease of performing the test clinically made it available for all with simple bacteriological technique; it required no incubator but took ten days to perform.—The second method of estimation, shown by Mr. H. W. KINNERSLEY and Mr. O'BRIEN, depended on a colour reaction given by the pure vitamin in solution. Crystals of vitamin B_1 were also provided for inspection.

Other demonstrations dealt with desensitisation without shock (Dr. J. W. de W. G. Thornton, Bristol); the metabolism of creatine by the perfused heart (Dr. R. B. Fisher and Mr. A. E. Wilhelmi, Oxford); experiments on crystalline pepsin (Mr. J. St. L. Philpot and Mr. B. R. S. Mainwaring, Oxford); bacterial metabolism of cellulose (Dr. E. Walker, Oxford); dietary heart-block in pigeons (Dr. C. W. Carter, Oxford); estimation of pituitary extract on the guinea-pig uterus; vaginal smears for estimation of œstrus-producing hormone (Prof. J. H. Burn, London); action of drugs on trypanosomes; action of drugs on exsected human tissues (Prof. J. A. Gunn, Oxford); action of drugs on the uterus in situ (Dr. T. B. Heaton, Oxford); the application of the Marchi technique to the reptilian brain (Dr. F. Goldby, Cambridge); and the experimental study of reproduction in monkeys (Dr. S. Zuckerman, Oxford).

SECTION OF PUBLIC MEDICINE

A MEETING of this section was held under the presidency of Dr. W. M. WILLOUGHBY.

Shell-fish

Dr. R. W. DODGSON (London) opened a discussion on Shell-fish and the Public Health. For forty years, he said, sewage-polluted molluscan shell-fish had been known to be capable of transmitting typhoid fever and other diseases to the human consumer. Shell-fish from unclean beds were manifestly a dirty food since an average-sized mussel or oyster could in twenty-four hours filter out, and retain within itself, almost all the suspended matter from at least 10 gallons of water. Sir George Newman had said in 1920 that as long as sewage-polluted shell-fish were consumed by large numbers of the population it was doubtful whether the incidence of the typhoid fever would be much reduced. Since that date the amount of sewage discharged near shell-fish beds had increased. Attempts to grapple with the situation had been made, but the measures adopted had been ineffective. So-called purification of sewage offered no solution of the problem. Removal of pollution by deviation of sewers and sterilisation of sewage effluents were methods made impracticable by expense. Closure of polluted fisheries by Administrative Order, under the Ministry of Health Shell-fish Regulations (1915 and 1934) had been resorted to on a considerable scale, approximately two-thirds of the mussel beds in England and Wales being closed. The resultant gap in supply was filled largely by imported shell-fish; but these in turn were often seriously polluted and came from countries in which the incidence of typhoid was much greater than in our own. Wholesale closure of shell-fish beds, while crippling the home industry, failed to provide adequate protection of public health. Anyone could still collect shell-fish for his own consumption or for sale for bait and there was good reason to believe that mussels taken ostensibly for these purposes found their way to markets.

Experience had convinced him that the only solution of the problem lay in an unfailing system of purification under stringent government control. The alternative seemed to be that sooner or later molluscan shell-fish as a whole would have to be officially banned as a food. Any system of purification had to be a satisfactory safeguard, simple and not disproportionately expensive. Dr. Dodgson then showed a film of the systems of purification of mussels at Conway and oysters at Brightlingsea. The mussels were spread about two deep in tanks, hosed and then flooded with water which had been sterilised with bleaching-powder and neutralised with sodium hyposulphate. This water was drained off after twenty-four hours and more sterile sea-water run in for another day. Then in a final bath the mussels were exposed for one hour to active chlorine (three parts per million) in order to clean their shells. The process for oysters was similar but in the winter the water had to be heated slightly to get them to open and pass the water through. Precautions were taken to sterilise the fisherman's boots and other articles which might contaminate the shell-fish once it had been purified. An additional precaution taken at Conway was the installation at the local isolation hospital, the effluent of which discharged into the estuary, of a plant for the incineration of dejecta, and the sterilisation by chlorine of sullage from the typhoid block.

A station for the purification of mussels had been set up in the season 1916–17 after an initial experi-

mental stage. The content of lactose-fermenting bacteria was found to be reduced by the process from some hundreds to five or less per cubic centimetre of tissue.

At the beginning of the 1935–36 season (and to a lesser extent in 1934) after one or two exceptionally good results, a period of abnormal bacterial counts had set in lasting, off and on, for about six weeks both at Conway and at Lytham. The plate counts were not merely outside the normal but excessively so; some hundreds of red colonies came up on MacConkey plates within twenty-four hours. The problem had been under intensive investigation since the outset. From the bacteriological investigation very suggestive results had been obtained. The main relevant points which had emerged were: that the barnacles, with which the mussels were often thickly studded, might harbour lactose-fractors in excessive numbers; that the lactose-fractor content of stored mussels, for example at the markets, might increase significantly, probably on occasion by reinfection from barnacles crushed in transit or by multiplication of a particular type of organism; that at any rate a large percentage of the "residual" lactose fractors were Gram-negative bacilli morphologically resembling *B. coli*, which grew best at 20° C., were Koser-positive but they liquefied gelatin; that some of these bacilli not only survived for long periods but might rapidly increase in sea-water; and that these lactose-fermenting bacilli had replaced the staphylococci which had formerly constituted the majority of residual organisms. In view of the facts emerging from this recent work the lactose-fractor criterion ad hoc was no longer adequate as an indicator of pollution of intestinal origin. The liquefaction of gelatin placed these organisms found outside the range of *coli ærogenes* controversies.

In judging a source of supply, Dr. Dodgson concluded, epidemiological evidence was one of the most important criteria; although complaints had been frequent in pre-purification days, only one (and that had been unproven) had been received in 21 years of purification.

Dr. H. P. NEWSHOLME (Birmingham) explained the difficulties of an inland authority which, with no first-hand knowledge of the cultivation and the collection of shell-fish, and no control over it, had to see that the food came to the consumer sound and free from risk of infection. For the detection of unsoundness naked-eye examination of shell-fish was useless. In bacteriological examination organisms of typhoid, paratyphoid, or dysentery were rarely isolated from shell-fish and *B. coli* had to be taken as presumptive evidence of sewage contamination. For this purpose he had adopted a comparatively lenient standard of *B. coli* content of over 100 per cubic centimetre of oyster. Epidemiological evidence required some harm to be done before action could be taken. The fourth line of investigation, that of topography, was beyond the official powers of the inland local authority. Since three of these lines of investigation presented such obstacles to the inland authority he thought that a medical officer of health was justified in regarding shell-fish showing repeated signs of bacterial contamination as a likely cause of danger to public health. Dr. Newsholme described how Birmingham had taken steps to protect itself from polluted shell-fish and some of the difficulties they had encountered. Two cases of typhoid, one fatal, had occurred in Birmingham from mussels from A. Inquiries had revealed that the so-called purification bed at A was exposed to discharge from three sewers. Although the M.O.H. had repeatedly drawn his council's attention to the risk, nothing had been done. No further supplies had come into Birmingham from A, but they might well be going elsewhere. He cited two other examples where the coastal authority had taken no action despite representations about contamination. A fourth authority had installed highly satisfactory purification plant. Although in each case the bacteriological evidence of pollution had been confirmed by topographical evidence, Birmingham as an inland authority had had no power to prevent further sale in its area of shell-fish from those sources. This power had, however, been obtained in the Birmingham Parliamentary Bill. The clause in the Bill enabled the M.O.H. to take action if consumption of particular shell-fish was likely to cause danger to public health—without waiting for actual illness. The Bill left the national problem unsolved. He considered that a ban should be put on cockles and winkles unless they had been steamed and on oysters and mussels unless they had been sufficiently cleansed.

Dr. CYRIL BANKS (Nottingham) said that in his area cases of typhoid arose from shell-fish consumption more especially among middle-aged men addicted to beer. He thought the wholesalers in that trade very shortsighted in taking no action. One small statement in a local paper from a medical officer on the dangers of shell-fish killed the trade for the year.

Dr. J. D. ROLLESTON mentioned that in France typhoid was so commonly caused by shell-fish that a special name was given to it when so produced.

Prof. J. W. BIGGER (Dublin) said he had found lactose fractors in sea-water and also in public water-supplies and the Thames.—Dr. C. F. WHITE (London) suggested that a motion urging compulsory purification should be sent to the public health committee of the British Medical Association, and the following resolution was unanimously adopted:—

"That the time has now arrived when the Ministry of Health should be requested to make regulations prohibiting the sale for human consumption in this country of molluscan shell-fish whether home produced or imported which are not certified to have been cleansed by a recognised method at a station approved for the purpose by the Ministry of Health."

Dr. DODGSON subsequently pointed out that the Ministry of Health had power already to make such an order.

MELKSHAM'S NEW HOSPITAL.—A £200,000 legacy has made it possible to start work on this hospital at once, and the first sod was cut recently by the chairman of the trustees on a site in Spa-road.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION.—During September courses will be held in plastic surgery (Sept. 16th and 17th); infants' diseases at the Infants Hospital (Sept. 21st to 26th); chest diseases at the Brompton Hospital (Sept. 21st to 26th); proctology at the Gordon Hospital (Sept. 28th to Oct. 3rd). Week-end courses have been arranged on general surgery at the Miller General Hospital (Sept. 19th and 20th); on ophthalmology at the Royal Westminster Ophthalmic Hospital (Sept. 26th and 27th); on fevers at the Park Hospital, Hither Green (Oct. 3rd and 4th); and on heart and lung diseases at the Royal Chest Hospital (Oct. 10th and 11th). A special evening course in anatomy and physiology in preparation for the primary F.R.C.S. examination will be given at the Infants Hospital from Sept. 14th to Oct. 22nd, and special evening M.R.C.P. courses will be held at the National Temperance Hospital (Sept. 8th to 24th); at the Brompton Hospital (Sept. 14th to Oct. 9th); at the Royal Chest Hospital (Sept. 21st to Oct. 9th). Demonstrations on pulmonary tuberculosis will be held at Preston Hall on Saturday, Oct. 3rd. Further information may be had from the secretary of the association, 1, Wimpole-street, London, W.1.

REVIEWS AND NOTICES OF BOOKS

An Introduction to Psychological Medicine

By R. G. GORDON, M.D., D.Sc., F.R.C.P. Edin., Physician, Royal United Hospital and Bath and Wessex Orthopædic Hospital, Bath; N. G. HARRIS, M.D., B.S. Lond., D.P.M., Physician in Charge, Woodside Hospital; and J. R. REES, M.A., M.D., D.P.H. Camb., Medical Director of the Institute of Medical Psychology. London: Humphrey Milford, Oxford University Press. 1936. Pp. 386. 10*s*. 6*d*.

THE experienced authors of this work are rightly desirous of providing the future medical practitioner with "some knowledge of mental mechanisms which will give him a basis for the understanding of life, of the psychoneuroses and the early stages and less dramatic aspects of the psychoses." They do not aim at instructing him about treatment, which should be reserved for post-graduate study, but rather at making him familiar with normal and pathological functions and the nature of disease: "given this knowledge, diagnosis will be relatively easy and appropriate, treatment not hard to apply." Some text-books of psychiatry, it must be conceded, baffle or repel the average student; whereas the present introduction is conceived on plain and elementary lines. It has the advantage for the hurried or uncritical beginner of being readily—if deceptively—understandable in its theoretical portions, but it gives a smooth and well-rounded, rather than a faithful or modern, presentation of the subject. The average student, reading it, may well be attracted to the study of psychological medicine when it appears in a guise so much easier to grasp than other text-books, or an immediate acquaintance with its complexities, would indicate. The 22 chapters of the book are designed to cover the ground of as many lectures spread over the medical course. The first section gives a coherent, if rather old-fashioned, account of normal psychology; the next two, on psychopathology and the neuroses, are dependent on much modified psycho-analytical conceptions; the eight following chapters on psychoses are a straightforward description on Kraepelinian lines, with one chapter on the legal aspects of insanity. The book concludes with two chapters on mental deficiency and a short bibliography.

Fractures

Second edition. By PAUL B. MAGNUSON, M.D., Associate Professor of Surgery, Northwestern University Medical School, Chicago. London: J. B. Lippincott Company. 1936. Pp. 499. 25*s*.

THE appearance of the second edition of this book was to be expected. Despite the appearance, in the last year or two, of several more elaborate works, Magnuson's "Fractures" remains one of the best. In small compass it really does cover the principles and practice of treatment of all the important fractures of the body, and leaves the reader with the feeling that he could apply the information. It is doubtful whether any text-book provides a more straightforward account of head injuries than is here contributed by Dr. Loyal Davis. Some may disagree with his wholesale condemnation of subtemporal decompression for relief of increased intracranial tension; others with his advocacy of hypertonic solutions. But at least he gives chapter and verse for his practice, and by reducing the indications for operative surgical treatment to three—viz., middle meningeal hæmorrhage, subdural hæmatoma, and depressed fracture—he encourages clear thinking.

Among the many practical "tips" contained in the book may be specially mentioned the methods of suspension during application of plaster-of-Paris splints to the leg; the method of maintaining inversion of the foot whilst applying a cast; and the author's method of treating fractures of the os calcis, by first cutting the tendo Achilles, and then forcibly disimpacting, moulding the fragments, and plastering over a felt pad. The text abounds with points of practical importance, clearly illustrated. We welcome the paragraph on the value of the prone position in the transportation of fractures of the spine, and the advice to use sufficient traction to reduce fractures of the femur within a matter of hours, and not of days. In consideration of the numbers of fractures that must receive first-aid treatment from doctors on the road, it seems as if more space might be devoted to first-aid treatment in a work such as this, written, as it is, for the "needs of the man who first sees the fracture." We still feel that the figure-of-eight plaster bandage is a dangerous method to illustrate for the treatment of supracondylar fractures of the humerus in children. It is so simple to apply, and in a small arm it is so liable to reproduce the displacement. But these are small criticisms.

Die Tuberkelbazillämie in ihrer Auswirkung auf die Gesamtmedizin

By Prof. ERNST LOEWENSTEIN. Leipzig and Vienna: Franz Deuticke. 1936. Pp. 388. M.20.

Prof. Loewenstein has brought together in this book the data on his special blood culture methods for *Bacillus tuberculosis* which have hitherto been scattered through many journals. It also contains a clinical section by Profs. Carl Reitter, Wilhelm Neumann, and Otto Kren of Vienna.

Loewenstein began his investigations some 25 years ago, and during this period modifications in technique have, of course, become necessary, so that an authoritative book by the author was obviously needed. In brief his method consists in using (1) a special medium for the cultivation of the bacillus, and (2) a special technique for removal of hæmoglobin from the blood and a slow centrifugation to obtain a deposit suitable for planting on the medium. In his various publications he has laid great stress on these details which he regards as of fundamental importance and has pointed out that other workers have often made important modifications and then claimed that their poor results were obtained by his method. He has now examined more than 24,000 cases with this technique, but unfortunately there is no detailed protocol in the book setting forth the results of the whole series. Chapters are devoted to the cultivation of tubercle bacilli not only in various types of tuberculosis but also in cases of chorea, diseases of the central nervous system, dementia præcox, and other diseases which the medical world does not generally regard as tuberculous in origin. The work is supported by Reitter in the case of polyarthritis, by Neumann in different types of pulmonary tuberculosis, and by Kren in cutaneous tuberculosis. The results are of such importance that the question was referred to a committee of the Health Organisation of the League of Nations which issued a report

last winter (Quart. Bull. Health Organisation, Geneva, 1935, iv., 818). Loewenstein's present book may be regarded as a reply to the report, but the fact still remains that workers outside Vienna have mostly been unable to obtain the high proportion of positive results which Loewenstein himself describes. Readers who are interested and whose work is vitally affected by the Loewenstein records should therefore read his apologia side by side with the League of Nations report.

On the basis of his findings Prof. Loewenstein has elaborated a theory of infection with the tubercle bacillus. He believes that it can reach the blood stream through the intestinal mucosa without any primary complex therein, through trauma, especially after operation, and in other ways; that there are other forms of the tubercle bacillus to be found infecting man apart from those which are generally recognised (witness the work on filtrable viruses and dissociation); and that allergy is a result. With much that he writes bacteriologists will agree, and they will one and all be grateful to him for the introduction of so excellent a medium for the routine cultivation of the tubercle bacillus; but most bacteriologists have been unable to get the same results from the blood culture experiments, and, as Prof. Jensen remarks in the League of Nations report, there must be some undetected fallacy in Loewenstein's laboratory work which it is his duty to discover.

Foundation of Provincial Medical Education in England

By EDWARD MANSFIELD BROCKBANK, M.B.E., M.D., F.R.C.P., Honorary Consulting Physician to the Manchester Royal Infirmary. Manchester: University Press. 1936. Pp. 192. 8*s*. 6*d*.

THIS book is a contribution to the history of British medicine in the period which saw the first attempts to enforce systematic medical teaching. His view extends over the whole field, but has special reference to the establishment of the Manchester school, of which school he was himself until recently a distinguished ornament. Now that he has retired from the teaching staff he has devoted himself to this study of the efforts of his predecessors. In order to make clear the story of the rise of the provincial schools the author has found it necessary to survey the whole field of medical education in this country at the beginning of the nineteenth century.

It is difficult in our own time to conceive the medical profession without the general practitioner. Yet, as Dr. Brockbank tells us, until the year 1815, "anyone could practice as a physician, surgeon, or apothecary without any recognised degree or diploma from the licensing corporations, or any legal control, and very many persons did so throughout England and Wales." Up to that time the practice of medicine was largely in the hands of the charlatan, though there were of course many practitioners who had in various ways attempted to fit themselves for their work, largely by the system of apprenticeship. In 1815 the Society of Apothecaries promoted a bill in Parliament which made it illegal for anyone not licensed by the Society to call himself an apothecary anywhere in England and Wales; and any man not already in practice in that year must in future become a licentiate of the Society if he attended, prescribed, and dispensed medicine in a medical case. Soon after this bill became law there was a considerable stir in the Royal Colleges to ensure that their candidates should have had a reasonable preparation before presenting themselves for examination, and in the provinces, notably in Manchester, definite schools of medicine were established which before long became recognised as appropriate places of medical instruction. Their establishment was to some extent due to the fact that the medical instruction available in London was expensive for the provincial student and also was thought to be haphazard and uncontrolled by the teachers, who made little or no effort to see that their alleged pupils learnt anything.

The first quarter of Dr. Brockbank's book is devoted to an account of the activities, and also it must be said the inertia, of the Colleges and the Universities of Oxford and Cambridge. He has also added some account of the education given in Scotland, Ireland, and the Continent. Then he passes to Manchester, and the bulk of the book contains a detailed account of the foundation and the founders of that school, which is fortunate to have secured such an accomplished historian.

Out of the Night

By H. J. MULLER, Professor of Zoology, University of Texas. London: Victor Gollancz Ltd. 1936. Pp. 160. 4*s*. 6*d*.

IN these days of general pessimism for the future of mankind it is refreshing to find one who retains a burning faith in man's ultimate physical and spiritual improvement. Prof. Muller is chiefly noted for his work on the induction of mutations by irradiation, and he here explores the possible application of genetics to human affairs. He is quite sure that the spectacular control that we are already gaining over our physical environment will soon be followed by an equally extensive control over ourselves. We shall in fact one day be able to produce men whose characteristics are all "good." This need not in his view entail the destruction of marriage nor of its connexion with procreation and the upbringing of children. He envisages the cultivation and selection in vitro of germ cells and the introduction of suitable ones into the parent. Those of us who can agree with him on the desirability and effectiveness of such measures are still involved in a familiar vicious circle which the author does little to break. Improvement, he says, can only be effected by such means when man has more of the spirit of coöperation and has ceased to accept competition as being of the eternal nature of things. This can only happen as the result of a change in the structure of society. But how, we may ask, is the structure of society to change without a previous alteration in man himself? This however presents no difficulty to Prof. Muller, since he is convinced that society will inevitably become more rational and coöperative. Though the history of the past few years may constitute a merely temporary set-back, the reader might be pardoned for not immediately sharing this optimism. There is nothing fantastic in the suggestions from a biological standpoint; they merely involve an extension of techniques already partially developed. But how are we to persuade the majority of the human race that the intelligent and benevolent application of scientific methods to man himself is at least one of the essential conditions for salvation? This is surely the fundamental problem and one which this book does little to solve.

British Journal of Children's Diseases

THE July-September issue (Vol. XXXIII.) contains the following contributions:—

BLOOD STUDIES IN INFANCY: A Comparison of the Red Counts and Hæmoglobin Values of Premature Infants and Twins with those of Full-term Children. By Dr. Alice Stewart. The principal conclusions are: (1) there is a rapid reduction in the hæmoglobin immediately after birth, the maximum drop occurring between the ninth and eleventh weeks; (2) the red cells also fall, but the colour-index remains high; (3) after the third month there is a gradual rise in hæmoglobin and red cells until the sixth month—full-term children reach a higher level than twins or premature children respectively; (4) the colour-index is rarely low before the seventh month, when the average value is 0·92; (5) in older children who develop anæmia the colour-index is usually low, the number of cells often remaining normal in spite of the hæmoglobin falling to 50 per cent.

EPIDEMIC CATARRHAL JAUNDICE: With Special Reference to its Epidemiology. Dr. W. N. Pickles gives an account of three epidemics of catarrhal jaundice, including a large one in 1929–30, which he had reported previously in the Aysgarth rural district of Yorkshire.

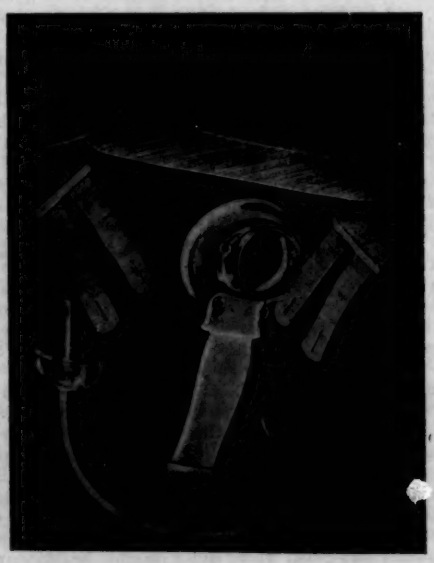
A CASE OF CONCURRENT DIPHTHERIA AND VARICELLA WITH HÆMORRHAGIC FEATURES. By Dr. J. W. Healey. The patient was a girl aged 6 years admitted to hospital with severe nasopharyngeal diphtheria. A sparse eruption of varicella developed on the third day of disease and continued to appear during the next two days. The lesions were hæmorrhagic and had a purplish area around them. There were also petechiæ on the neck and chest, and ecchymoses at the sites of injections and the left upper eyelid. The attack of diphtheria was virulent and that of varicella was trivial, so that the diphtheria toxin was responsible for the hæmorrhages, the concurrent attack of varicella serving partially to determine their location and distribution. Death took place on the twelfth day. There was no autopsy.

Dr. E. W. Goodall describes AN ABNORMAL DICK REACTION. The patient was a girl aged 15 years admitted to hospital on the third day of scarlet fever, when a positive Dick reaction was obtained. She had a relapse of scarlet fever on the seventeenth day when the reaction at the site of the second Dick test performed two days previously was shown by an intensely crimson red area of indurated skin and two completely white areas of blanching. Like Toomey, who has reported a similar case, Goodall regards the redness as an Arthus's reaction.

NEW INVENTIONS

A NEW COLOSTOMY OUTFIT

FOR cases with a permanent colostomy opinions differ about the respective advantages of evacuation by daily colonic irrigation or by various drugs internally. The former is more complete in its action and more satisfactory during a working day than the very messy indirect method of medication. The following apparatus was used perfectly satis-



factorily by two patients, each for two years, without any dire results, such as the "irritable colon" said to follow irrigation in some cases. It is known as the "Totus Securus" colostomy combined irrigation outfit.

Besides the usual douche can with its tube and clip, the outfit consists of an adjustable belt, a 3-foot rubber tubular reservoir with outlet clip (the shorter tube in the Figure is for day use), and a celluloid dome with detachable cap for introducing the catheter, which has a special reflux guard and sliding collar. The apparatus forms a compact combination for irrigation and for wear (with the shorter reservoir tube) during the day. This makes it very suitable for hospital patients who cannot afford multiple apparatus. For others, a smaller apparatus, No. 2, on similar lines and as easily cleaned, but less conspicuous under the clothes, is made for day use, but not for irrigation. The flushing aperture and tubular reservoir ensure rapid, easy, and effective cleansing without removing the belt. The reservoir is large enough to contain, if necessary, the whole of the evacuation. This dispenses with the need for a pail in the bedroom or for monopolising the use of the lavatory—an important matter when staying away from home. The reservoir should, of course, preferably be emptied at conveniently frequent intervals. A hook is provided on the belt for the attachment of the outlet clip when evacuation of the bowel is nearly complete. This halves the length of the reservoir tube and permits the apparatus to be worn conveniently under the clothes without showing at the ankle. Once the apparatus has been adjusted and closed the user can proceed to shave, dress, and walk about and generally save time. An unexpected advantage I found to be that little or no odour escapes, and the whole apparatus, with ordinary care, is leak-proof. All parts are detachable for a periodical thorough cleaning and can be purchased separately. Owing to the rubber cushion and to the central suspension of the weight of the full reservoir the outfit is surprisingly comfortable to wear, and the whole colostomy toilet can be effected without spilling a drop of either clean or contaminated water.

The outfit has been made for me by Messrs. John Bell and Croyden, 50, Wigmore-street, W.1.

JOHN I. F. KNIGHT, M.R.C.S. Eng.

PETERBOROUGH HOSPITAL.—As a memorial to the late King it is proposed to build a maternity wing at Peterborough Hospital. There is great need for further extensions to meet the requirements of the district.

THE LANCET

LONDON: SATURDAY, SEPTEMBER 5, 1936

THE INCIDENCE OF CANCER IN MAN

WHY does cancer attack one person and spare another? This is one of the fundamental questions concerning its ætiology, and until recently there seemed to be no reasonable answer. It is not enough to say that a normal cell undergoes a mutation or a change in metabolism, or that it is entered by a virus. That tells us merely *what* is supposed to have happened, but not *why* it has happened. The apparently incalculable way in which cancer strikes down its victims, often without any preliminary signs of ill-health, has surrounded the disease with an air of a cruel mystery. But the knowledge gained in recent years from experimental carcinogenesis is beginning to dispel this atmosphere of gloom; and we are now beginning to understand the complex nature of the conditions which determine the onset of new growths in man. The argument that has been developed, mainly in publications from the Imperial Cancer Research Fund, may be briefly summarised as follows. Cancer does not as a rule appear suddenly like a bolt from the blue in a normal or healthy tissue or organ. It starts in an area that has previously undergone pathological changes in response to a number of different agencies acting for a long time. Malignancy is therefore preceded by a precancerous condition, which is induced more easily in some individuals than in others and which is, in itself, not always sufficient to produce clinical symptoms of a definite disease. The malignant change does not take place throughout the whole precancerous area, but only in one or two very small sharply circumscribed centres. Nor does it follow as a matter of course once the precancerous condition has been established. It is a separate event, and it is conditioned by systemic factors that vary in different individuals, so that cancer develops more readily in some than in others. Thus we have to postulate factors determining a resistance and a susceptibility to carcinogenesis; and this indicates several lines of clinical and statistical investigation—to identify the various precancerous conditions for each organ and the extrinsic conditions which induce them, and to obtain information about the factors governing resistance or susceptibility to the disease.

In the human skin the development of cancer is clearly perceptible, and the existence of precancerous states has long been recognised by dermatologists. The deep-seated organs, however, present greater difficulties. In the mamma, LENTHAL CHEATLE, examining sections of the whole breast, has identified Schimmelbusch's disease—or, to use his more restricted term, "cystiphorous desquamative epithelial hyperplasia"—as a precancerous lesion which is responsible for 20 per cent. of all mammary cancer. The correctness of this view has been established by recent work in which the precancerous condition (as well as cancer) of the breast was induced in mice by long-continued administration of ovarian hormones, thus giving a clue to at least one of the factors responsible for the development of mammary cancer.[1] From clinical and pathological studies of gastric disorders, A. F. HURST has come to the conclusion that achlorhydric chronic gastritis is a lesion that often precedes gastric carcinoma. What are the conditions which bring about this precancerous lesion of the stomach? Some information bearing on this question can be obtained, as CRAMER has pointed out, from the remarkable variations in the frequency of gastric cancer in different populations. Gastric cancer is twice as common in Dutch men and women as in English men and women; it is also much commoner in the lower social classes than in the upper social classes, at any rate in this country. Starting from these facts a joint investigation has been carried out on cases treated in two big London hospitals, a private English clinic, and in the university clinic in Amsterdam. Dr. G. M. A. LINTOTT,[2] who has studied the factors involved in the varying incidence in different classes and in the two different countries, comes to the conclusion that there is no *inherent* susceptibility of the stomach to cancer among the poorer classes, or among the Dutch, and that therefore the higher incidence in these two groups must be due to some extrinsic factor. In searching for this extrinsic factor, Mr. W. E. HERBERT, of Guy's, and Dr. E. BRUSKE,[3] of Amsterdam, have compared the diet and dental conditions in about 500 patients of the same class in London and Amsterdam. They find that the difference in diet consists in a higher consumption of bread, cheese, and vegetables, and a lower consumption of meat, among the Dutch. The incidence of open oral sepsis, the temperature of the food taken, and the consumption of spiced food, spirits, and tobacco were considerably higher for the Dutch group. It must not be assumed, however, that all these differences, or any one of them, are necessarily concerned in the ætiology of the disease, and it is possible that in making the comparison some factors have been overlooked. At this early stage of such an investigation the researcher is in the position of a detective who has to begin by suspecting all those who were present when the crime was committed, and then by gradual elimination of those who can prove an alibi, may eventually succeed in identifying the culprit. It is interesting to find that in a similar investigation carried out by L. F. CRAVER[4] a few years ago in the United States, dental disease was noted as very common among sufferers from gastric cancer, many of whom also had a habit of taking food

[1] Lacassagne, to whom we owe this discovery, has recently published an interesting summary of his work in the Amer. Jour. Cancer, 1936, xxvii., 217.
[2] Guy's Hosp. Rep., July, 1936, pp. 293 and 298.
[3] Ibid., p. 301; Brit. Dent. Jour., August 1st, 1936, p. 153.
[4] Amer. Jour. Cancer, 1932, xvi., 68.

and drink very hot; whereas no reason was found to regard the consumption of spiced foods, alcohol, and tobacco as habits of ætiological importance.

If the external factors concerned in the causation of cancer produced their effect whenever they were allowed to operate, the task of identifying them would not be difficult and would have been accomplished long ago. But fortunately for mankind—although unfortunately from the point of view of investigation—they do not. The factors of susceptibility and resistance also enter into the process. Cancer will develop in a susceptible individual as the result of a degree of carcinogenic stimulation that will leave another individual intact; in occupational cancer, for instance, only a small fraction of those at risk develop the disease. But it should be realised that so far as the experimental evidence (obtained from highly inbred strains of mice) goes this susceptibility to cancer is not a property extending to all organs. It is possible to inbreed from cancerous parents, by brother and sister matings, strains of mice which show an abnormally high incidence of spontaneous mammary cancer; yet the skin of animals of such a strain is not abnormally susceptible to the carcinogenic action of tar. The recent experiments of L. KREYBERG [5] and of CRAMER [6] have shown that, on the contrary, the skin of mice that have developed mammary cancer or are about to develop it are definitely resistant to the action of tar, and CRAMER goes so far as to say that this phenomenon suggests something analogous to immunity between the two organs—skin and mamma. There is, however, no such inhibition for the same organ. Both clinical and experimental experience show that when cancer has appeared in one organ and has been removed, it may later arise anew in the same organ. In KREYBERG's inbred line, with an incidence of 68 per cent. of spontaneous mammary cancer, the incidence of skin cancer produced by tar painting was 17 per cent., compared with an incidence of 85 per cent. of skin cancer in a different inbred but related line having an incidence of only 2 per cent. of mammary cancer. In CRAMER'S experiment on an inbred strain with an incidence of 35 per cent. of spontaneous mammary cancer, the incidence of skin cancer was 47 per cent., compared with an incidence of 77 per cent. of skin cancer in a mixed strain that developed no mammary cancer at all. In both experiments the occurrence of mamma cancer had reduced the incidence of skin cancer, and in CRAMER'S observation there is also an indication of the opposite effect—a slight reduction in the incidence of mamma cancer due to the development of skin cancer. The net result of this antagonism is that the total cancer incidence in the different strains—i.e., the sum of skin and of mamma cancer—is about the same, although the organ incidence may show wide variation.

One must be careful in transferring these results, obtained in genetically pure strains, directly to man, whose strains are mixed. Nevertheless a very similar observation may be made among human beings; for in different populations the total cancer mortality is found to be approximately equal despite considerable differences in the organ incidence. This rule applies, as CRAMER has shown, to populations of the same sex and of different sexes, and it means that the total cancer mortality does not merely represent the sum total of the mortality from cancer in the different organs, but is regulated by an intrinsic factor in such a way that a high mortality in one group of organs is compensated by a low mortality in another group. In a paper published on p. 552 Dr. S. PELLER displays this phenomenon again, but from a somewhat different angle. He demonstrates, on the basis of the English cancer statistics arranged in occupational groups, that when in one such group one or two organs are affected by cancer with exceptional frequency, some other organs show a diminished incidence. It is not clear why he should argue from this that cancer is from its very beginning a general disease with unilocal primary manifestations. It is, for instance, difficult to understand how a general disease can be cured by removing its local manifestation. But all the evidence available at present goes to support our faith in the efficacy of local treatment. It would indeed be regrettable if the conception of cancer as a general disease should lead to doubts, in doctor or patient, about the necessity for surgical or radiological treatment at a stage when it is still localised.

At the end of his paper Dr. PELLER discusses the interesting possibility that by deliberately eliciting skin cancer and then removing it, we could diminish the incidence of cancer in other organs where it is less amenable to treatment. At present neither experimental nor statistical evidence suffices for a forecast of the results of such a procedure. Although experimentally it has been possible to demonstrate an antagonism between skin cancer and mamma cancer, it does not follow that such an antagonism exists also between cancer of the skin and cancer of the other organs most often attacked. At the same time there is plenty of clinical material available for statistical analysis, in the form of persons who have suffered from skin cancer and have been cured. A careful inquiry into their subsequent history would make it possible to answer the question whether they have later been attacked by cancer in other organs more frequently or less frequently than their coevals in the rest of the population.

[5] Ibid., 1935, xxiv., 554.
[6] Jour. Path. and Bact., 1936, xliii., 77.

FLIES IN THE COUNTRYSIDE

WITH the coming of the internal combustion engine and the decline of the horse, the universal use of a water-carriage system of sanitation, and the weekly removal of the household dustbin, the house-fly has ceased to be an urban problem in this country. But it may still prove a serious pest for those who are obliged to live near the refuse dumps of our large towns, and it is as much a pest as ever in the country places.

It was on these grounds that the Health Organisation of the League of Nations convened a meeting of entomologists at the London School of Hygiene and Tropical Medicine last December, under the chairmanship of Major E. E. AUSTEN, to consider the house-fly in relation to rural hygiene. Some of the contributions to that meeting and the recommendations formulated at its conclusion have now been published.[1]

The meeting was concerned in the first place with methods of preventing the breeding of house-flies that are applicable to rural conditions; for the killing of flies is recognised by all as a completely ineffectual method of reducing their numbers. The discussion brought to light the differences existing in different countries, both in the prevalence of flies (they are evidently a far more serious nuisance on Danish farms than they are in this country) and in the results given by the same method of control. For example, in Denmark, where pig manure is the principal source of fly-breeding, Prof. M. THOMSEN has introduced with great success the method of covering the pig manure, each day as soon as it is brought out of the stables, with a layer of cow manure. The latter is unattractive to the flies and breeding is enormously reduced. But this method does not work in Hungary, where the flies readily deposit their eggs in cow manure. Another of Prof. THOMSEN's methods which has been adopted by many Danish farmers consists in sewing together old nitrate bags to make a cheap tarpaulin and covering with this the neatly stacked manure. The egg-laying females cannot reach the dung, and any maggots present in it are entrapped and killed by the heat of fermentation. It is a method that can be adapted to the disposal of refuse of all kinds, tarred paper being a useful covering material; it has even been employed on areas an acre or more in extent. The use of the heat of fermentation for the automatic destruction of eggs and maggots forms the basis also of Roubaud's "biothermic method" which was used with such success under war-time conditions in Egypt and elsewhere. The fresh manure is buried each day in the unattractive old manure; and any eggs it may contain are quickly cooked and killed. At the conference Prof. ROUBAUD described a simplification of this method which he has found successful in rural areas in France: the fresh manure is brought out in the evening and placed in a hollow on the surface of the old manure, and so rapid is the fermentation that by next morning the manure is unattractive to the fly. He described also a method, the normal manner of disposal in Alsace, of placing the manure in a small walled enclosure about three feet high. Fermentation eliminates the larvæ at the sides; the barn-door fowls control the upper surface. Unfortunately, most of these measures require more care and conscience than they are likely to receive unless their introduction is coupled with an energetic propaganda among the people.

That the house-fly, besides being a nuisance, is a potential carrier of human intestinal infections was proved conclusively some thirty years ago. How great a part it really plays is still uncertain, and this must obviously vary with the local conditions: some would regard the parallel decline of the house-fly and of infantile diarrhœa in England as being causally related. This uncertainty is apparent in the report under review. Prof. F. LORINCZ described observations in Hungary which showed the annual peak of the typhoid curve falling about three weeks after the peak of the fly-density curve—but he was not convinced that house-flies, which visited human fæces much less than might have been expected, were a main factor in the transmission of the disease. One of the recommendations put forward is that "a study should be made of the effects of the total suppression of flies, in the absence of any other hygienic improvement, in a village of which the epidemiology of typhoid and other intestinal diseases (infantile diarrhœa) is exactly known for the last five years or so." How interesting that would be; and how difficult, as Martin Arrowsmith discovered, is an experiment of that type to carry through!

[1] Quart. Bull. Health Organ. League of Nations, 1936, v., 201.

SAFE CATGUT

THE Minister of Health has issued a circular (No. 1563) to local sanitary authorities asking them to ensure that the catgut used in the hospitals for which they are responsible does not carry any risk of conveying infection. The risk, it seems, although numerically small is still a very real one. It is now six years since the manufacture of catgut for sale was placed under the Therapeutic Substances Regulations. Gut sterilised under expert control by the Ministry of Health has been shown during this period to be free from danger, but that does not apply in like measure to what is called home-cured catgut, when gut purchased raw or only partially sterilised before spinning has been treated in hospital or under the surgeon's direction by some process other than those of the regulations. The Minister is therefore urgently asking the responsible local authority to satisfy itself that, where catgut is used other than catgut issued under the Ministry's licence, the same precautions should be observed and the same tests applied as required by the Act.

There is little in the memorandum itself which was not available at the meeting of the section of surgery of the Royal Society of Medicine on Feb. 5th last, when discussion[1] was opened by a comprehensive paper read by Sir WELDON DALRYMPLE-CHAMPNEYS, but since that meeting further cases of post-operative tetanus have come to the knowledge of the Ministry; in these nine cases, of which five have proved fatal, evidence points strongly to home-cured catgut as the source of infection. The evidence in the three groups concerned is summarised in the memorandum,[2] issued with the circular, with a

[1] Proc. Roy. Soc. Med., March, 1936; see THE LANCET, 1936, i., 366.
[2] Ministry of Health, Memorandum on Surgical Catgut, Memo. 199 Med. H.M. Stationery Office. 2d.

moderation and impartiality that is very convincing, and most people will follow the Ministry in its belief that there are cases of post-operative tetanus which do not come to public notice, especially when the infection is not fatal. It must be admitted that the tetanus spore is a difficult customer all too capable, like the hare in Struwwelpeter, of sitting snug in leaves and grass and laughing to see the green man pass. It must indeed be very pleasant for a pathogenic spore to be enclosed in the human incubator with a prospect of weeks ahead to recover from its contact with enervating antiseptics, and there have been two factors which have been long working in favour of its chances of so doing. It has been the practice of certain manufacturers of catgut partially to sterilise the gut before spinning and then to mark the product as "internally sterile" or "partially sterilised" catgut. Since no claim is made that such gut is ready for surgical use it does not come under the control of the Act, but purchasers may be misled into thinking that this partial sterilisation counts for more than it really does. The other item which has led to undue confidence in chemical sterilisation is the fact that it is well-nigh impossible to determine the sterility of gut which has been chemically treated, inasmuch as the chemicals exert a bacteriostatic action sufficient to invalidate all the usual tests. It is an open question whether pathogenic micro-organisms so fixed would be able to grow in the human body in the presence of the impregnating chemicals.

There are many methods in which attempt has been made to produce a completely sterile product, and the claims and drawbacks of all of these are set out in the memorandum. The contention of R. O. CLOCK that heat is the only safe and positive means of sterilising catgut sutures is regarded as an extreme view; it is well established that sterile gut with good physical properties has been produced by other methods. Particular mention is made of the result of combining the hydrogen-peroxide and iodine-water processes under factory conditions, but the Ministry is clear that the effectiveness of mercurial salts in sterilising catgut has been greatly overrated and that the action on spore-bearing bacteria of essential oils, such as those of cloves, peppermint, and eucalyptus, is negligible. The memorandum draws four conclusions from the facts available: (1) that efficient sterilisation of catgut is far from simple; (2) that serious danger attends the use of raw catgut to which sterilising processes of doubtful efficacy have been applied; (3) that many brands of efficiently sterilised gut controlled under the Therapeutic Substances Act are available; (4) that post-operative infections can be prevented by the use of these brands or of gut sterilised by similar methods. But while attention to these conclusions should eliminate immediate risk there still remains much to investigate.

ANNOTATIONS

THE NATIONAL COLLECTION OF TYPE CULTURES

THE second edition of the Catalogue of Type Cultures maintained at the Lister Institute was issued in 1925, and the third in 1931. The fourth,[1] which has just appeared, is 47 pages longer—partly because of the use of a larger, clearer type and a more readable lay-out, and partly because many new strains have been added to the Collection. In addition, an arrangement has been made with several research laboratories whereby the collections of microbes they are peculiarly fitted to maintain are at the disposal of approved investigators. These include the fungi of the Forest Products Research Laboratory, and a list of no less than 32 filtrable viruses from different institutions. Among the new bacteria are the 17 serological types of *Streptococcus hæmolyticus* of Griffith, and McLeod's mitis, gravis, and intermediate types of the diphtheria bacillus.

The curators of the collection are evidently conservative in their attitude towards nomenclature. The American bacteriologists' endeavour to divide the vast list of microbes, recorded under the generic name *Bacillus*, into appropriately named genera, is receiving qualified recognition in this and other countries, but there is no unanimity over the naming of several groups. The catalogue employs only those newer names that have received unqualified approval. One important division has been made: the name *Bacillus* has been restricted to spore-bearing bacteria, whether aerobic or anaerobic. The majority of the remaining rod-shaped microbes are listed now under *Bacterium*, which covers, for example, *pestis*, *proteus*, *coli*, and the dysentery groups. Even *Pseudomonas* has lost the generic distinction it enjoyed in the old edition, and is merged in the *Bacteria*. On the other hand, the scheme recently agreed upon for the classification of the Gram-negative intestinal parasitic bacteria has been recognised, and the typhoid and paratyphoid bacilli have been removed and placed with the ever-growing food-poisoning group under the title of *Salmonella*. It is to be hoped, for the benefit of the vexed bacteriologist, and the still more sorely vexed reader of bacteriologist's reports, that more subdivisions of this unwieldy group will receive official recognition in time to be embodied in the next edition of this excellent catalogue.

[1] Catalogue of the National Collection of Type Cultures maintained by the Council at the Lister Institute of Preventive Medicine, Chelsea Bridge-road, London, S.W. Fourth edition. Med. Research Council, Spec. Rep. Ser. No. 214. London: H.M. Stationery Office. 1936. Pp. 159. 2s. 6d.

WORLD REQUIREMENTS OF NARCOTICS

As a corrective to disparaging remarks that have appeared in some sections of the press in regard to the work of the League of Nations in combating the traffic in dangerous drugs, a statement has been prepared for publication by the Secretariat of the League. Since 1930 the reports furnished by the countries, party to the several opium conventions, have enabled the Secretariat to determine year by year the amount of the legitimate production and consumption of morphine, heroin, and cocaine respectively. It appears from the statistics supplied that the world's legitimate supply of morphine has fallen from 38 tons in 1930 to 26 tons in 1934. More than 21 of the 26 tons were used for conversion into other drugs and it seems probable that not more than

7 tons of morphine, as such, are needed annually to meet the world's legitimate requirements. This reduction in the manufacture of morphine is greatest in the older producing countries such as Germany, France, Switzerland, and the United States, while a tendency in the opposite direction is evident in States such as Belgium, Hungary, Poland, Sweden, and Czechoslovakia which have only lately embarked on the manufacture of morphine. The legitimate production of heroin to meet world requirements has fallen from 4 tons in 1930 to 1 ton in 1934, and of cocaine from just under 6 tons in 1930 to 3½ in 1934. The United States is the largest producer of morphine among the countries of the world, while Japan is responsible for the largest output of heroin and cocaine. Having regard to the statistics furnished to the League, the Secretariat feels justified in concluding that the world production of heroin and cocaine now approximates to what may be considered the amount necessary for legitimate consumption, and that in the case of morphine it is possible that last year the amount manufactured may even have been less than that legitimately required. The Secretariat accordingly claims that the work of the League in controlling the traffic in dangerous drugs has been amply justified, while in no way minimising the menace of clandestine manufactories and the alarming amount of illicit production and traffic that still continue.

TRAINING FOR PSYCHIATRY [1]

THE series of articles on the training of neurologists and psychiatrists, which has been noticed in THE LANCET [2] while in course of publication, has now been collected into a brochure. In these nine statements of representative opinion, the preoccupation of most of the writers has been to define widely the limits of his own specialty. Each concedes the debatable ground where neurosurgeon meets neurologist, pædiatrician meets psychiatrist, or psychotherapist meets neurologist; and each holds that the other must not encroach further and claim too much. In spite of such opinions, which might be expected to lead to divergent conclusions as to training, there is a large measure of agreement between the contributors—of whom five are neurologists (Walshe, Brouwer, Riley, Lhermitte, Ramsay Hunt), two are psychiatrists (Strecker, Meyer), one a pædiatrician (Veeder), and one a neurosurgeon (Penfield). They recognise for the most part that the neurologist cannot give wholly adequate treatment to patients with mild mental disorders, especially psychoneuroses, unless he has had some sound psychiatric training, and that such patients will inevitably form an important part of his practice; they recognise that the psychiatrist is handicapped unless he has had an adequate training in neurology as well as in medicine generally, and they are unanimous in denouncing the doctrine, widespread among those who practise psychotherapy, that for this popular branch of medical practice a thorough grounding in neurology and psychiatry is superfluous or harmful. This question of the treatment of the psychoneuroses bulks largely in the various essays. As the editorial summing up puts it—

"When one reads the articles of this series it is all too patent that the main bone of contention is the large group of the psychoneuroses. . . . Besides the neurologist and the psychiatrist, many others with less training than they have entered into the competition for practice in the psychoneuroses. Psycho-analysts, some of them without either neurologic or psychiatric training, mental hygienists, child guidance specialists, clinical psychologists, cultists and quacks—'the seven and twenty warring sects of psychotherapy' (Walshe)—now take their place in the front line with the trained physician."

Indeed, Dr. Walshe's allusion, made in the first article of the series, is frequently quoted by other contributors; in the last article in the book, Dr. Ramsay Hunt repeats it in the following passage:

"One may feel certain also that three years devoted to the private practice of psychiatry alone is entirely insufficient to enter that great field envisaged by Adolf Meyer. Such a requirement would open the door to one of the greatest dangers to modern psychiatry to-day, the poorly trained psychotherapeutist who ekes out a career on a flimsy structure of one or the other of what Walshe has aptly termed 'the seven and twenty warring sects of psychotherapy.'"

Other special topics, such as training for research, are given provident consideration by the writers, who are clearly aware of the complexity of issues that are too often lightly dismissed. They do not, as one may see especially in the articles by Prof. Adolf Meyer and Prof. Strecker, regard psychiatry as mainly a matter for psychological and social study along lines remote from general medicine and biology, nor do they expect neurology, as we know it, to provide the means of treating, or indeed investigating mental illness, which transcends the limited range of part-functions with which neurology deals. Dr. Walshe, however, thinks that it may fall to the neurologist "in the future to import reason and the scientific outlook into a field (the psychoneuroses) that has for too long been the happy hunting ground of the half-trained enthusiast." For the special cases of the neurosurgeon, and of the physician engaged in child guidance, it is agreed that the latter must be thoroughly grounded in pædiatrics and that the former should have a good neurological training unless he works in close association with a competent neurologist.

CLINICAL RECORDS OF INFLUENZA

IN the earlier part of last year Laidlaw pled for "a more refined and intensive clinical analysis of cases of the influenza type." [1] The clinician knows as well as the pathologist that the word "influenza" as he uses it covers a collection of different illnesses varying from pandemics to feverish colds, and he must admit that his unaided study of them has failed to isolate clear-cut groups clinically distinguishable. The pathologists, led by Laidlaw and his colleagues, have now discovered an influenza virus, which they can obtain from the human patient, propagate by passage in ferrets and mice (from which, upon occasion, they may apparently reinfect themselves),[2] and identify with considerable precision by protection experiments using immune horse serum. They have found this virus in some recent minor epidemics of "influenza" but not in others, and they have found its first cousin in "swine influenza," a disease which affects the pigs of America and seems to date from 1918. The importance of assessing the responsibility of this virus for various minor influenza epidemics, and its possible relation to pandemics, is obvious. To this end search for the virus must go hand in hand with accurate clinical observation and

[1] The Training of the Neurologist and the Psychiatrist. Reprinted from the Archives of Neurology and Psychiatry. New York. 1934–35.
[2] THE LANCET, 1934, i., 31.

[1] Laidlaw, P. P.: THE LANCET, 1935, i., 1118.
[2] Smith, W., and Stuart-Harris, C. H.: Ibid., July 18th, 1936, p. 121.

description of epidemics. Hence Laidlaw's plea. As if in answer to it Dr. R. E. Smith has just published[3] his experience of influenza outbreaks in 1931–34 in Rugby School, where as medical officer he has the opportunity to observe Nature's experiment performed under conditions simplified and circumscribed by man. His 1932 epidemic involved 354 boys out of about 600 in the first wave, and 56 in a later wave. In its uncomplicated form it was a febrile illness, lasting three or four days, usually with an acute pharyngitis (not necessarily painful), and often with congestion of the nasal mucosa and a mild cough. Aching eyes were common, but aching backs and limbs were strikingly rare. Pronounced malaise was seldom complained of, and recovery was apparently prompt without a period of undue physical or mental lassitude. Routine temperature-taking showed that in many cases fever preceded the first symptoms by 12 to 24 hours. Coryza was not a feature. A number of the patients developed bronchitic, pneumonic, otitic, and other complications, which Dr. Smith discusses in some detail, but these are no doubt attributable to secondary invasion by familiar micro-organisms. To the investigator his description of the primary disease is of the greater interest. For obvious reasons no attempts to obtain virus were made, and the identity of this disease with proved virus influenza is not established; two features indeed thought to be characteristic of the proved epidemics are lacking—namely, initial generalised aching, and a degree of prostration especially during convalescence, out of proportion to the fever. More such descriptions are needed, if the clinical sorting out of the "influenzas" is to advance in parallel with the pathological investigations, and large semi-isolated communities like public schools and units in the Services provide ideal opportunities for them.

CROWNS AND BRIDGES

THE letter from Mr. J. H. Olver which appears on p. 601 should do something to clear up a misapprehension about fixed dental appliances that undoubtedly exists. When Dr. William Hunter first drew attention to the possibilities of dental sepsis as a factor in general disease, he laid emphasis on the sepsis associated with crowns and bridges. Other physicians followed him until in some quarters a crown or bridge was assumed to be always a septic focus and its very existence implied a condition that called for the extraction of the supporting teeth. When Hunter first started his campaign there was this amount of support for such a view—namely, that crowns and bridges were usually fixed to pulpless teeth, which had either become so by the progress of dental caries or had been deliberately devitalised by the dentist in order to provide a strong anchorage for a fixed appliance. A pulpless tooth, though not necessarily infected, is at least under suspicion; hence the condemnation of crowns and bridges. But the syllogism implied is not above reproach and the evolution of dental technique often falsifies the minor premiss. All pulpless teeth are septic; crowns and bridges are only placed on pulpless teeth, therefore they are septic, and the corollary that they must be removed follows. But, as Mr. Olver points out, crowns and bridges can be, and often are, placed on living teeth, so that the minor premiss of the syllogism is often untrue. Even the major premiss may be questioned; a pulpless tooth may be under suspicion, but its potentiality as a septic focus is not necessarily increased because it supports a crown or bridge. Such a tooth is no worse than one that has a filling. Evidence of infection as shown clinically or radiographically may make its extraction desirable. Even in the absence of such evidence there are cases in which the elimination of all doubtful teeth may be a wise precaution. But the presence of a crown or bridge does not make the condition of the tooth worse nor should the existence of a fixed appliance lead a doctor in his search for a focus of infection to condemn beforehand the teeth involved and thus embarrass the dental surgeon on whom rests the responsibility for passing judgment. It is important that medical men should realise that modern dental technique has not stood still and that a crown or bridge is not necessarily synonymous with a pulpless tooth. It is true that their construction calls for a high degree of skill and that the dentist must make sure that the teeth used as anchorage are free from paradontal disease, and the appliance itself so made that it does not harbour stagnation. Equally, there is a responsibility on the patient to maintain an adequate standard of oral hygiene. But, so long as these conditions are fulfilled, crowns and bridges have a legitimate place in dental surgery, and the able contention of Mr. Olver will be generally approved by the dental profession.

[3] Smith, R. E.: Guy's Hosp. Rep., July, 1936, p. 269.

JOHN HOWARD

THE assistant director of the Johns Hopkins Hospital, Baltimore, Dr. John Ransom, has contributed to the American newspaper *Hospitals* a graphic sketch of the life of John Howard, philanthropist and prison reformer. The information is largely founded on Howard's own records, and he was neither a profuse nor a very good writer, his time being fully occupied in inspection of prisons in this country and abroad. The intolerable distress of many prisoners came under his notice when he was High Sheriff of Bedfordshire in 1773; he was then about 45 years of age—curiously enough there is some doubt as to the exact date of his birth—so that his life-work started when he was of middle age; but he had travelled already extensively on the continent, and his experiences were of the greatest value to him in his later itineraries. As High Sheriff his attention was drawn to the fact that frequently prisoners against whom the prosecutors had failed to appear were detained in jail until they had paid certain fines to the jailers. Anger at such a monstrous situation was the starting-point of Howard's work. He was roused to visit the county jails of England, and found the particular evil rampant and the jails to be not only centres of gross abuses but subject to epidemics of small-pox and the ravages of "gaol fever" or typhus. Howard in a campaign of reform determined to see what happened in other countries, and Dr. Ransom describes visits to continental cities, which included Copenhagen and Stockholm; Cronstadt, Moscow, Warsaw, and Constantinople; Rome, Bologna, Genoa, and Milan; Madrid and Paris. There are several lives of Howard in which his experiences and investigations in this country and on the continent are recorded in detail, and Dr. Ransom quotes sufficient instances of hardship and misery among the populations of prisons and lazarettos to prove the existence 150 years ago of conditions unbelievably horrible. Howard's work was followed by many reforms, but these followed none too quickly or thoroughly upon the exposures, and the Howard League for Penal Reform was founded in 1866 to promote the right treatment of delinquents

and the prevention of crime. The league has been active and watchful, and to-day most of the horrors seen, and sometimes practically experienced, by Howard have disappeared from this country, although they remain rooted in certain European countries. Howard did noble and progressive work, and his statue in St. Paul's Cathedral bears testimony to his services to mankind.

SERUM TREATMENT OF TUBERCULOSIS

Of all the immunological remedies for tuberculosis, antisera have been the most disappointing. From Sweden comes an account of clinical experiments with a new one, produced by Reenstierna, which is prepared by the inoculation of sheep with antigens composed of acid-fast and non-acid-fast (coccoid and diphtheroid) forms of the tubercle bacillus. The sheep is immunised by subcutaneous injections given every ninth or tenth day over a period of four months, starting with 5 c.cm. of the acid-fast and 10 c.cm. of the non-acid-fast forms and finishing with 100 c.cm. and 400 c.cm. So far Reenstierna has not been able to devise a satisfactory method of standardisation of the serum and therefore the dosage has had to be governed chiefly by trial and error. Hanson [1] has tested the serum on patients at Apelviken, the largest sanatorium in Sweden, and his material includes 21 cases of lupus, 52 of glands of neck, 7 of cutaneous tuberculosis, 11 of tuberculosis of the eye, and 41 of tuberculosis of bones and joints, making a total of 132 cases. The lupus cases did very well, as shown by illustrations included in Hanson's paper. For the rest, the results appear to be variable. A focal reaction analogous to that which follows tuberculin sometimes followed the injection, but no other abnormalities were noted and there were no cases of anaphylactic shock. Although the work is merely in a preliminary stage it seems worth continuing.

EPIDEMIC ENCEPHALITIS

Several outbreaks of encephalitis have been reported from the United States during the past few years. Most of them have affected comparatively small areas, and though they have differed in certain minor features, they have all had this in common —that they were something different from the recurrent epidemics of encephalitis that began in Europe during the late war. Up to now the largest of these outbreaks is the St. Louis epidemic of 1933 in which there were more than 1000 cases. In the one which affected Windber in Pennsylvania last year there were only 160 patients, but Dr. Slesinger's account [2] of it contains many facts of interest. The season was July and August; the maximum incidence was from July 25th to August 7th, and the peak on July 30th. The proportion of males to females affected was about 3 to 2, and there were only 17 patients over thirty and only 6 under two years of age. The disease was highly contagious, and the clinical features were always much the same. Sudden headache of great severity was followed by nausea and perhaps vomiting. The headache was usually occipital, but pains also occurred in other parts of the head and in the trunk, including backache and abdominal cramps. Generalised muscular pains and vertigo were often persistent and troublesome, and sleeplessness was not uncommon.

Physical signs were few. In a few of the more severe cases there was slight stiffness of the neck and a moderately positive Kernig's sign. In a few cases, too, the pupils were irregular. The soft palate always showed characteristic changes: it was injected and presented a fine vesicular eruption giving a strawberry-like appearance. The temperature was only slightly raised and usually fell to normal in two or three days. The pulse-rate was rather slow. The blood count with rare exceptions was normal. In 32 cases lumbar puncture was performed, and in all but 2 of these the fluid was clear: in one of these it was opalescent, in the other it was bloody. As a rule pressure was slightly increased. Globulin was present in all cases. Cell counts were usually increased to between 50 and 100; the highest was 670, and the cells were lymphocytes. The amount of sugar in the cerebro-spinal fluid was normal or slightly decreased.

The attacks could be divided into three types: (1) the mild or abortive, in which acute symptoms lasted only about 24 hours; (2) the moderately severe, which lasted for a week or so, sometimes with headache persisting for several weeks; and (3) the severe, or fulminating. The last group contains only one case, that of a boy aged 13 who was taken suddenly ill, went rapidly into coma, and died after two days. At autopsy numerous petechial hæmorrhages were found throughout the brain, and a large area of hæmorrhage in the posterior end of the thalamus which had burst into the lateral ventricle. "The findings are those of an acute hæmorrhagic meningo-encephalitis." Among the 159 who recovered there were seldom any complications or sequelæ: only 7 complained of after-effects, and three months after the outbreak all were well except 1 who still had some headache and vertigo. After the first ten days convalescent serum, obtained from earlier cases, was used in the more severe attacks, and it was thought to reduce the duration and severity of symptoms. It was also given prophylactically to the 7 members of the hospital staff most exposed to infection, none of whom developed the disease.

It will be noticed that in most ways this outbreak is very different from the form of encephalitis with which Europe has been familiar in the past, to which the name encephalitis lethargica was originally given by Economo in 1917. The seasonal incidence, mode of onset, contagiousness, course, and sequels are none of them the same; indeed, almost the only similar features are the sex- and age-incidence. Quoting the terminology proposed in the St. Louis report,[3] Slesinger assigns the Windber outbreak to Group II. of the following classification:—

Group I.—Type A encephalitis or encephalitis lethargica (encephalitis of Economo).

Group II.—Type B encephalitis or *epidemic encephalitis* (Japanese form and St. Louis form). (Italics are ours.)

Group III.—Post- or para-infectious encephalitis.

Group IV.—Other forms of encephalitis, such as post-vaccinial.

According to this scheme, the adjective "epidemic" is reserved for encephalitis of Type B, such as is seen in Japan and the United States, and we cannot help thinking this a source of confusion to those who consult the vast literature of encephalitis accumulated during the past two decades. Although in England the Registrar-General still retains the term "encephalitis lethargica" for purposes of official notification, the medical profession generally has largely abandoned it both in speaking and in writing, using in preference the term "epidemic encephalitis" (sometimes, it is true, adding

[1] Hanson, R.: Acta Med. Scand., 1936, Suppl., lxxiii.
[2] Slesinger, H. A.: Acute Epidemic Encephalitis—a Clinical Study of 160 Cases, Amer. Jour. Med. Sci., August, 1936, p. 225.
[3] Report on the St. Louis Outbreak of Encephalitis. U.S. Pub. Health Bull., No. 214, 1935.

"lethargica"). In the United States a similar terminology has been quite generally adopted, and since it started in 1927 the Quarterly Cumulative Index Medicus has classified all the references to Economo's encephalitis under the heading of "epidemic encephalitis." The reasons that originally made it desirable to substitute the term "epidemic" for "lethargic" were that epidemicity was conspicuous, whilst lethargy, though often present, was by no means constant. Possibly the time may come when more suitable and distinctive names may be chosen for the various types of encephalitis, but meanwhile we would urge that the name "epidemic encephalitis" should not be taken away from a condition to which it has been almost universally applied for more than ten years, and transferred to more recent types, differing in almost every important respect, whose epidemicity is no greater.

Another question of terminology also arises on Dr. Slesinger's otherwise excellent article; for it contains the statement that "von Economo described the typical 'post-influenzal' encephalitis lethargica in 1916." We had hoped that with the passing of time this supposed connexion with influenza had vanished for ever. It is true that epidemic influenza is present in some part or other of the world so often that almost any outbreak of encephalitis may be said to be "post-influenzal" or possibly "pre-influenzal." But if by "post-influenzal" is meant "propter-influenzal," we know of no evidence justifying its application to Economo's disease.

THE DANGERS OF THORIUM DIOXIDE

THORIUM dioxide is now widely used in the diagnosis of cerebral, arterial, and hepatic conditions, and many people hold that it is a harmless drug. Fleming and Chase, however, bring forward a good deal of evidence to suggest that it should be used with great caution.[1] They maintain that there is no doubt about the radio-activity of this substance; it has been estimated that thorium and its disintegration products give off from 4390–26,340 alpha particles per gramme per second, and that its average life is twenty-five thousand million years.

The first patient quoted by these authors is a man of 34 who had an intravenous injection of Thorotrast in order to outline a tumour in the liver. A good deal of drug escaped into the tissue around a vein and caused local inflammation which soon subsided, leaving small firm lumps. A month later gradual progressive enlargement of these lumps began, and smaller new lumps appeared. Four months later there was pain and interference with function and a number of nodules had to be dissected out. On section they showed a large amount of pale brownish refractive material lying partly free but mostly within large macrophage-type cells. There was a diffuse hyaline fibrous tissue enveloping blood-vessels and nerves. The reaction appeared to be a hyaline fibrosis.

The second patient was a man of 65 with an inoperable cancer of the bronchus. Five months before he died he had 50 c.cm. of thorotrast intravenously. No gross evidence of thorium was found in the reticulo-endothelial tissues at autopsy but there were many diffuse, finely granular, pale brown refractive masses between the liver cells and in the capillary, endothelial, and Küpffer cells. In portal spaces the material was surrounded by fibroblasts, which in many places were mature. It seemed to be a definite productive hepatitis. A frozen section of this liver was mounted on a glass slide and placed 1 cm. above the emulsion surface of a panchromatic "M" photographic plate. A small lead arrow was placed between the plate and the liver and, after five days, a photographic shadow of the arrow had developed, showing that the thorium in a section of liver 30 microns thick was sufficient to give off rays which could be photographed.

Fleming and Chase think that both mechanical and physical properties are concerned in the tissue responses to thorium, and point out that the proliferative reaction in their two cases was greatest where connective tissue is normally most abundant, and was surprisingly absent in the spleen and the lymph glands. They conclude that the intravenous administration of thorium dioxide preparations is undesirable when the expectancy of life is more than two years.

[1] Fleming, A. J., and Chase, W. H. (Montreal): Surg., Gyn., and Obst., August, 1936, p. 145.

DEFINING THE SPECIALIST

A NEW hall-mark has been designed for physicians in the United States and Canada by the American Board of Internal Medicine,[1] which will hold examinations and grant certificates. The candidates must be of "satisfactory moral and ethical standing in the profession"; they must be members of the American Medical Association or of a society approved by its council on medical education; they must have held an internship of at least a year in an approved hospital, and since holding it must have had at least three years' special training in internal medicine and two years' special practice in internal medicine or one of its branches. In laying down this five-year minimum the Board emphasise that a longer period is advisable, and that they do not want to make rigid rules about how or where the training should be obtained; "the time and training are but means to the end of acquiring a broadness and depth of knowledge." The responsibility rests with the candidate and he may acquire them at home or abroad; for medical teaching and knowledge are international.

"A sound knowledge of physiology, biochemistry, pharmacology, anatomy, bacteriology, and pathology, in so far as they apply to disease, is regarded as essential for continued progress of the individual who practises internal medicine. The mere factual knowledge of medicine and its basic sciences is not sufficient. The candidate must have had training in their use in furthering his understanding of clinical medicine. This implies practical experience under the guidance of older men who bring to their clinical problems ripe knowledge and critical judgment. Preparation to meet this requirement adequately may be even more difficult to obtain than the so-called scientific training. It may, however, be acquired in the following ways: (*a*) by work in a well-organised hospital outdoor clinic conducted by competent physicians; (*b*) by a prolonged period of resident hospital appointments likewise directed by skilled physicians; (*c*) by a period of training in intimate association with a well-trained and critical physician who takes the trouble to teach and guide his assistant rather than to require him only to carry out the minor drudgery of a busy practice."

The work of the new Board is similar to what is already done for other specialties by such bodies as the American Boards for Ophthalmic Examinations and for Otolaryngology. Next July it proposes to inaugurate similar procedure for granting additional certificates for branches such as gastro-enterology, cardiology, metabolic diseases, tuberculosis, and allergic diseases. The examination in general internal medicine is to be in two parts, written and clinical,

[1] The chairman is Dr. Walter L. Bierring (406, Sixth-avenue, Des Moines, Iowa); the vice-chairman Prof. Jonathan Meakins of Montreal; and the secretary-treasurer Dr. O. H. Perry Pepper of Philadelphia. There are six other members, and the Board represents the American College of Physicians and the American Medical Association (section on practice of medicine) on a 5:4 ratio.

and those who want additional certificates will have to pass at least the first part of the general examination.

THE ONION AGAIN

LAST year Haggard and Greenberg[1] of Yale, investigating the cause of the socially disastrous odour that persists in the breath of those who have eaten onion or garlic, concluded that this smell arises solely from the presence of alliaceous particles retained in the mouth, and to cure it they confidently recommended a mouth-wash containing chloramine. According to Blankenhorn and Richards[2] of Cincinnati, those who put their faith in such a mouth-wash are living in a fool's paradise; it is true that a 1 per cent. solution of chloramine will mask the odour for perhaps an hour, but it will then return and persist for 18 hours or more. They attribute their predecessors' errors to the use of a chemical rather than an olfactory test for the smell of onions, and so far from believing that the odour originates in alliaceous particles lingering in the mouth, they have shown that it can be detected in the breath of one fed with garlic or onion by a route other than the mouth. Thus a patient with complete occlusion of the œsophagus due to carcinoma was fed, through a gastrostomy opening, first with garlic soup, and secondly with an infusion of onions. On both occasions the tell-tale odour appeared in the breath. Another patient, whose larynx had been removed for carcinoma and who breathed through a tracheotomy fistula, was fed with a garlic and onion salad. Three and four hours later, even when his nose was pinched shut, the odour could be detected in the breath exhaled through the fistula. A third patient, a boy with a laryngeal stricture who was breathing through a tracheal fistula, was given a capsule containing the essential oil of garlic which he swallowed whole. By closing his mouth and nose, it was made necessary for him to exhale completely through the fistula; yet three, six, and even twelve hours later the odour of garlic was apparent to three separate observers in the air thus expired. Blankenhorn and Richards would have us return to the old theory that alliaceous odours come from the blood by way of the lungs.

ABDOMINAL MYOMECTOMY

Alexander of Liverpool, in 1898, was the first in this country to publish a series of cases of abdominal myomectomy, and in the August issue of the *Journal of Obstetrics and Gynæcology of the British Empire* Prof. Arthur Gemmell, also of Liverpool, has produced one of the most comprehensive surveys of the indications, risks, and benefits of this method of treating fibroids. Victor Bonney, in a Hunterian lecture that we printed in 1931, made out a strong claim for the operation, and maintained that it is usually no more risky than a total hysterectomy. Its advantage is that the uterus is conserved, and this may be of incalculable importance to a woman in the child-bearing period. Prof. Gemmell, who supplements the experience of the Liverpool school with a wide reference to recent writings and the results of a questionnaire to professors of gynæcology throughout the world, is able to reach several definite and important conclusions. The mortality of abdominal myomectomy lies, he says, between 1·3 and 5 per cent., being about the same as that of total hysterectomy; he has also established that the morbidity-rate is no higher than that of hysterectomy, and has thereby successfully laid a ghost. After the operation fibroids recur in 4–8 per cent. of cases, and in 80 per cent. menstruation returns to normal. Of the patients who are likely to conceive after operation about a quarter become pregnant, and not more than 2 per cent. of these have abnormal labours; rupture of a scar is extremely rare. Myomectomy during labour is, however, a dangerous procedure, and hysterectomy is to be preferred in such circumstances.

These conclusions are reached from an analysis of some hundreds of cases. They are very encouraging and will further the cause of conservative surgery.

[1] Haggard, H. W., and Greenberg, L. A.: Jour. Amer. Med. Assoc., 1935, civ., 2160; see THE LANCET, 1935, ii., 316.
[2] Blankenhorn, M. A., and Richards, C. E.: Jour. Amer. Med. Assoc., August 8th, 1936, p. 409.

THE COLONIAL MEDICAL SERVICE

IN 1934 the Colonial Medical Service was constituted as a separate branch of the Colonial Service. The first Colonial Medical Service List,[1] which has just been published, contains the regulations governing the composition of the new Service and the appointments, promotion, transfer, and practice of its members. There are two schedules: the first gives offices whose holders automatically became members of the Service in 1934; the second includes the amendments since that date. Finally there is the alphabetical list of officers with a record of their qualifications and appointments, past and present.

THE following medical appointments have been made to the household of the Duke and Duchess of York:—To be physicians-in-ordinary: Dr. G. F. Still, Sir John Weir, Dr. H. L. Tidy, and Dr. D. T. Davies. To be surgeons-in-ordinary: Sir Lancelot Barrington-Ward and Mr. A. E. Porritt.

Major-General E. W. C. Bradfield, surgeon-general with the Government of Bombay, has been selected to succeed Major-General Sir Cuthbert Sprawson as director-general of the Indian Medical Service when he retires. General Bradfield is hon. surgeon to the Viceroy of India and was formerly professor of surgery at the Medical College, Madras. He was appointed assistant director of medical services in 1932.

Sir Walter Burford Johnson is about to retire from his post of director of the Nigerian medical and sanitary services which he has held since 1929. Sir Walter took part in the work of the Yellow Fever Commission in 1913 and in the tsetse-fly investigation in Nigeria in 1921.

WE regret to learn the death of Lady Moynihan which occurred on August 31st, suddenly, at Carr Manor, Meanwood, Yorkshire. She was Isabella Wellesley, daughter of the late Prof. T. R. Jessop, a distinguished surgeon in Leeds and the first professor of surgery in what was then the Yorkshire College, now the University of Leeds.

Lieut.-Colonel S. P. James, F.R.S., has retired from his position as medical officer and adviser on tropical disease to the Ministry of Health. Leaving the Indian Medical Service at the end of the late war he joined the staff of the Ministry (then the Local Government Board) in 1918, and has since devoted most of his time to the problem of malaria. Abroad he has done important work on the League of Nations Malaria Commission and other bodies, while at home he has added much to our knowledge of the disease by his observations on infections induced in the course of malariotherapy.

[1] London: H.M. Stationery Office. 1936. Pp. 66. 1s.

"lethargica"). In the United States a similar terminology has been quite generally adopted, and since it started in 1927 the Quarterly Cumulative Index Medicus has classified all the references to Economo's encephalitis under the heading of "epidemic encephalitis." The reasons that originally made it desirable to substitute the term "epidemic" for "lethargic" were that epidemicity was conspicuous, whilst lethargy, though often present, was by no means constant. Possibly the time may come when more suitable and distinctive names may be chosen for the various types of encephalitis, but meanwhile we would urge that the name "epidemic encephalitis" should not be taken away from a condition to which it has been almost universally applied for more than ten years, and transferred to more recent types, differing in almost every important respect, whose epidemicity is no greater.

Another question of terminology also arises on Dr. Slesinger's otherwise excellent article; for it contains the statement that "von Economo described the typical 'post-influenzal' encephalitis lethargica in 1916." We had hoped that with the passing of time this supposed connexion with influenza had vanished for ever. It is true that epidemic influenza is present in some part or other of the world so often that almost any outbreak of encephalitis may be said to be "post-influenzal" or possibly "pre-influenzal." But if by "post-influenzal" is meant "propter-influenzal," we know of no evidence justifying its application to Economo's disease.

THE DANGERS OF THORIUM DIOXIDE

THORIUM dioxide is now widely used in the diagnosis of cerebral, arterial, and hepatic conditions, and many people hold that it is a harmless drug. Fleming and Chase, however, bring forward a good deal of evidence to suggest that it should be used with great caution.[1] They maintain that there is no doubt about the radio-activity of this substance; it has been estimated that thorium and its disintegration products give off from 4390–26,340 alpha particles per gramme per second, and that its average life is twenty-five thousand million years.

The first patient quoted by these authors is a man of 34 who had an intravenous injection of Thorotrast in order to outline a tumour in the liver. A good deal of drug escaped into the tissue around a vein and caused local inflammation which soon subsided, leaving small firm lumps. A month later gradual progressive enlargement of these lumps began, and smaller new lumps appeared. Four months later there was pain and interference with function and a number of nodules had to be dissected out. On section they showed a large amount of pale brownish refractive material lying partly free but mostly within large macrophage-type cells. There was a diffuse hyaline fibrous tissue enveloping blood-vessels and nerves. The reaction appeared to be a hyaline fibrosis.

The second patient was a man of 65 with an inoperable cancer of the bronchus. Five months before he died he had 50 c.cm. of thorotrast intravenously. No gross evidence of thorium was found in the reticulo-endothelial tissues at autopsy but there were many diffuse, finely granular, pale brown refractive masses between the liver cells and in the capillary, endothelial, and Küpffer cells. In portal spaces the material was surrounded by fibroblasts, which in many places were mature. It seemed to be a definite productive hepatitis. A frozen section of this liver was mounted on a glass slide and placed 1 cm. above the emulsion surface of a panchromatic "M" photographic plate. A small lead arrow was placed between the plate and the liver and, after five days, a photographic shadow of the arrow had developed, showing that the thorium in a section of liver 30 microns thick was sufficient to give off rays which could be photographed.

Fleming and Chase think that both mechanical and physical properties are concerned in the tissue responses to thorium, and point out that the proliferative reaction in their two cases was greatest where connective tissue is normally most abundant, and was surprisingly absent in the spleen and the lymph glands. They conclude that the intravenous administration of thorium dioxide preparations is undesirable when the expectancy of life is more than two years.

[1] Fleming, A. J., and Chase, W. H. (Montreal): Surg., Gyn., and Obst., August, 1936, p. 145.

DEFINING THE SPECIALIST

A NEW hall-mark has been designed for physicians in the United States and Canada by the American Board of Internal Medicine,[1] which will hold examinations and grant certificates. The candidates must be of "satisfactory moral and ethical standing in the profession"; they must be members of the American Medical Association or of a society approved by its council on medical education; they must have held an internship of at least a year in an approved hospital, and since holding it must have had at least three years' special training in internal medicine and two years' special practice in internal medicine or one of its branches. In laying down this five-year minimum the Board emphasise that a longer period is advisable, and that they do not want to make rigid rules about how or where the training should be obtained; "the time and training are but means to the end of acquiring a broadness and depth of knowledge." The responsibility rests with the candidate and he may acquire them at home or abroad; for medical teaching and knowledge are international.

"A sound knowledge of physiology, biochemistry, pharmacology, anatomy, bacteriology, and pathology, in so far as they apply to disease, is regarded as essential for continued progress of the individual who practises internal medicine. The mere factual knowledge of medicine and its basic sciences is not sufficient. The candidate must have had training in their use in furthering his understanding of clinical medicine. This implies practical experience under the guidance of older men who bring to their clinical problems ripe knowledge and critical judgment. Preparation to meet this requirement adequately may be even more difficult to obtain than the so-called scientific training. It may, however, be acquired in the following ways: (*a*) by work in a well-organised hospital outdoor clinic conducted by competent physicians; (*b*) by a prolonged period of resident hospital appointments likewise directed by skilled physicians; (*c*) by a period of training in intimate association with a well-trained and critical physician who takes the trouble to teach and guide his assistant rather than to require him only to carry out the minor drudgery of a busy practice."

The work of the new Board is similar to what is already done for other specialties by such bodies as the American Boards for Ophthalmic Examinations and for Otolaryngology. Next July it proposes to inaugurate similar procedure for granting additional certificates for branches such as gastro-enterology, cardiology, metabolic diseases, tuberculosis, and allergic diseases. The examination in general internal medicine is to be in two parts, written and clinical,

[1] The chairman is Dr. Walter L. Bierring (406, Sixth-avenue, Des Moines, Iowa); the vice-chairman Prof. Jonathan Meakins of Montreal; and the secretary-treasurer Dr. O. H. Perry Pepper of Philadelphia. There are six other members, and the Board represents the American College of Physicians and the American Medical Association (section on practice of medicine) on a 5 : 4 ratio.

and those who want additional certificates will have to pass at least the first part of the general examination.

THE ONION AGAIN

LAST year Haggard and Greenberg[1] of Yale, investigating the cause of the socially disastrous odour that persists in the breath of those who have eaten onion or garlic, concluded that this smell arises solely from the presence of alliaceous particles retained in the mouth, and to cure it they confidently recommended a mouth-wash containing chloramine. According to Blankenhorn and Richards[2] of Cincinnati, those who put their faith in such a mouth-wash are living in a fool's paradise; it is true that a 1 per cent. solution of chloramine will mask the odour for perhaps an hour, but it will then return and persist for 18 hours or more. They attribute their predecessors' errors to the use of a chemical rather than an olfactory test for the smell of onions, and so far from believing that the odour originates in alliaceous particles lingering in the mouth, they have shown that it can be detected in the breath of one fed with garlic or onion by a route other than the mouth. Thus a patient with complete occlusion of the œsophagus due to carcinoma was fed, through a gastrostomy opening, first with garlic soup, and secondly with an infusion of onions. On both occasions the tell-tale odour appeared in the breath. Another patient, whose larynx had been removed for carcinoma and who breathed through a tracheotomy fistula, was fed with a garlic and onion salad. Three and four hours later, even when his nose was pinched shut, the odour could be detected in the breath exhaled through the fistula. A third patient, a boy with a laryngeal stricture who was breathing through a tracheal fistula, was given a capsule containing the essential oil of garlic which he swallowed whole. By closing his mouth and nose, it was made necessary for him to exhale completely through the fistula; yet three, six, and even twelve hours later the odour of garlic was apparent to three separate observers in the air thus expired. Blankenhorn and Richards would have us return to the old theory that alliaceous odours come from the blood by way of the lungs.

ABDOMINAL MYOMECTOMY

Alexander of Liverpool, in 1898, was the first in this country to publish a series of cases of abdominal myomectomy, and in the August issue of the *Journal of Obstetrics and Gynæcology of the British Empire* Prof. Arthur Gemmell, also of Liverpool, has produced one of the most comprehensive surveys of the indications, risks, and benefits of this method of treating fibroids. Victor Bonney, in a Hunterian lecture that we printed in 1931, made out a strong claim for the operation, and maintained that it is usually no more risky than a total hysterectomy. Its advantage is that the uterus is conserved, and this may be of incalculable importance to a woman in the child-bearing period. Prof. Gemmell, who supplements the experience of the Liverpool school with a wide reference to recent writings and the results of a questionnaire to professors of gynæcology throughout the world, is able to reach several definite and important conclusions. The mortality of abdominal myomectomy lies, he says, between 1·3 and 5 per cent., being about the same as that of total hysterectomy; he has also established that the morbidity-rate is no higher than that of hysterectomy, and has thereby successfully laid a ghost. After the operation fibroids recur in 4–8 per cent. of cases, and in 80 per cent. menstruation returns to normal. Of the patients who are likely to conceive after operation about a quarter become pregnant, and not more than 2 per cent. of these have abnormal labours; rupture of a scar is extremely rare. Myomectomy during labour is, however, a dangerous procedure, and hysterectomy is to be preferred in such circumstances.

These conclusions are reached from an analysis of some hundreds of cases. They are very encouraging and will further the cause of conservative surgery.

[1] Haggard, H. W., and Greenberg, L. A.: Jour. Amer. Med. Assoc., 1935, civ., 2160; see THE LANCET, 1935, ii., 316.
[2] Blankenhorn, M. A., and Richards, C. E.: Jour. Amer. Med. Assoc., August 8th, 1936, p. 409.

THE COLONIAL MEDICAL SERVICE

IN 1934 the Colonial Medical Service was constituted as a separate branch of the Colonial Service. The first Colonial Medical Service List,[1] which has just been published, contains the regulations governing the composition of the new Service and the appointments, promotion, transfer, and practice of its members. There are two schedules: the first gives offices whose holders automatically became members of the Service in 1934; the second includes the amendments since that date. Finally there is the alphabetical list of officers with a record of their qualifications and appointments, past and present.

THE following medical appointments have been made to the household of the Duke and Duchess of York:—To be physicians-in-ordinary: Dr. G. F. Still, Sir John Weir, Dr. H. L. Tidy, and Dr. D. T. Davies. To be surgeons-in-ordinary: Sir Lancelot Barrington-Ward and Mr. A. E. Porritt.

Major-General E. W. C. Bradfield, surgeon-general with the Government of Bombay, has been selected to succeed Major-General Sir Cuthbert Sprawson as director-general of the Indian Medical Service when he retires. General Bradfield is hon. surgeon to the Viceroy of India and was formerly professor of surgery at the Medical College, Madras. He was appointed assistant director of medical services in 1932.

Sir Walter Burford Johnson is about to retire from his post of director of the Nigerian medical and sanitary services which he has held since 1929. Sir Walter took part in the work of the Yellow Fever Commission in 1913 and in the tsetse-fly investigation in Nigeria in 1921.

WE regret to learn the death of Lady Moynihan which occurred on August 31st, suddenly, at Carr Manor, Meanwood, Yorkshire. She was Isabella Wellesley, daughter of the late Prof. T. R. Jessop, a distinguished surgeon in Leeds and the first professor of surgery in what was then the Yorkshire College, now the University of Leeds.

Lieut.-Colonel S. P. James, F.R.S., has retired from his position as medical officer and adviser on tropical disease to the Ministry of Health. Leaving the Indian Medical Service at the end of the late war he joined the staff of the Ministry (then the Local Government Board) in 1918, and has since devoted most of his time to the problem of malaria. Abroad he has done important work on the League of Nations Malaria Commission and other bodies, while at home he has added much to our knowledge of the disease by his observations on infections induced in the course of malariotherapy.

[1] London: H.M. Stationery Office. 1936. Pp. 66. 1s.

PROGNOSIS

A Series of Signed Articles contributed by invitation

CXII.—PROGNOSIS IN ACUTE OSTEOMYELITIS

ACUTE pyogenic osteomyelitis is at all times a serious disease, and, when one takes thought, picturing the immediate risks, the long duration of the illness, the tendency to repeated recrudescence, often at long intervals of time after the original illness, one is apt to be despondent, and to view the outlook with the gravest misgivings. It ought to be possible, however, to sift the evidence, to put facts as we know them in the balance, and in the end to give a prognosis which, while it may not be invariably accurate, is a reasoned outcome of observation and experience.

In general prognosis has had less attention than it deserves. The course and progress of many diseases can be outlined with great accuracy, and it demands no prophetic skill to foretell the issue; on the other hand, there are conditions, particularly of the acute type, in which doctors are apt to assume a non-committal attitude, to regard the future as a closed book, whose pages can only be read as each is unfolded day by day. Those who have experience of illness in their persons or in their families know something of the mental distress that such an attitude may engender. Better as a rule for the patient and his friends to know for good or ill, than to live in an anguish of uncertainty.

It is thus the duty of a doctor who has witnessed the behaviour of a disease on past occasions at least to try to estimate the course which it is likely to follow in the patient whom it is now attacking. It is clear that prognosis is something which text-books cannot fully teach; they may indicate the general lines upon which the problem may be considered, but to answer questions with reasonable assurance demands the knowledge which experience alone can give.

In acute pyogenic osteomyelitis there is no lack of material. Let us suppose that we are reviewing a case of osteomyelitis with the single purpose in mind of deciding what prognosis we are justified in giving, and what are the facts upon which our decision shall be based.

A Conception of the Disease

It is necessary first to have a clear conception of the clinical condition under review. Acute osteomyelitis is mostly a local evidence of a general disease. Only in exceptional cases—and these are infrequent—is the disease the result of an implantation of infection into the bone through the medium of trauma or of surgical operation. We are not here concerned with these cases but with those in which a septicæmia is the preceding event, and the focus of osteomyelitis is the result of a local deposit of an organism which is already in circulation. Acute osteomyelitis is most often the outcome of a pyæmia, generally staphylococcal in character, in which the organism exhibits a predilection for cancellous tissue as the site of its local activities. This conception of the disease is significant when prognosis is under consideration.

THE HISTORY

Resistance to infection varies in different persons, and any individual is likely to show varying degrees of resistance to different organisms. The Schick and the Dick tests are based upon this conception, and it is possible that in time the principle will have a wide application. In many people the natural resistance to the staphylococcus is inadequate. At present we have no test by which the degree of resistance can be estimated, but a review of the previous history will often afford a hint, and a record of liability to boils or other types of staphylococcal skin infection is suggestive. I am always apprehensive in a case of acute osteomyelitis in which there is a history of previous recurrent staphylococcal skin infection, because it indicates deficient resistance to this organism. This is the first peg upon which our estimate of prognosis will hang.

The characteristic history of the present condition includes two developments: local pain with tenderness and the evidence of a toxæmia with its accompaniments of fever, increased pulse-rate, malaise, and general body disturbance. Pronounced general disturbance has an ominous significance. The type of case which fills me with anxiety is that in which the patient from the beginning has shown signs of being overwhelmed by the toxæmia, so that he is listless and apathetic, with an insufficient temperature response, a rapid pulse-rate, and pronounced anorexia. Acute local symptoms, distressing though they may be, are less disturbing—in fact one may read into them a certain measure of promise, as they indicate appreciable resistance to the infective process.

THE AGE OF THE PATIENT

Age is a significant element in the prognosis, and, curiously enough, the influence is not what one might anticipate. In most acute illnesses the prognosis is more serious in the early years of life than at a later period, but I have found the reverse to be true in acute osteomyelitis. It has been my experience that the disease runs a less severe course and is associated with a lower mortality during the first three years of life than at a later period. There are probably several reasons for this anomaly, but two are specially important. The first is that during the early years of life the streptococcus is a more common infection than the staphylococcus, and, as we shall presently see, this is a factor of importance. The second influence concerns the texture of the bones, for at an early age the high proportion of cartilage in the epiphyses and the relatively porous nature of the cortex provide favourable conditions for the patient in his resistance to local infection. Suppuration makes its way to the surface more readily, sequestration is less extensive, and reaction is more pronounced. In my series of 57 cases the mortality in the first three years of life has been 4·6 per cent., while from the ages of four to fifteen years it has averaged 11·6 per cent. The two groups are not, however, strictly comparable, since the numbers of cases among very young children is only 12 against 45 older children.

THE SITE OF THE DISEASE

Prognosis becomes more gloomy the nearer is the the focus of infection to the trunk and body centres. Osteomyelitis of the femur is more serious than when it occurs in the tibia, disease of the humerus than that encountered in the radius. Even in indi-

vidual bones disease of the proximal metaphysis is apt to prove a graver matter than that of the distal end of the bone. It is difficult to see the reason for this difference unless, perhaps, absorption increases as the disease is more central.

The importance of site, however, has other aspects, and there are three which have specially to be borne in mind. Large metaphyseal areas such as occur at the lower end of the femur or the upper end of the tibia, if infected, present serious possibilities on account of the surface involved. Again the porosity of cortical tissue varies in different parts of the skeleton, and the closer the texture of the cortex the greater is the liability for the infection to remain imprisoned under tension within the medulla, so that absorption and toxæmia are increased. For example, the cortex of the lower end of the femur is particularly dense, and osteomyelitis in this region is invariably serious. The third consideration is an anatomical one. The metaphysis of a bone may or may not be included within the reflection of the synovial membrane; the distinction is well shown at the knee, where the lower femoral metaphysis is intra-articular, while the corresponding area of the tibia is extra-articular. Infection of the former is apt to be complicated by a secondary involvement of the joint, but this complication is uncommon where the upper tibial metaphysis is involved.

In some places blood-vessels lie in close relation to metaphysis, a characteristic example being the position occupied by the upper portion of the popliteal artery and its branches to the lower metaphysis of the femur. I have seen severe secondary hæmorrhages arise in this area as the result of infection eroding the vessel, and the complication provides another illustration of the part which anatomical relations play in the matter of prognosis.

Bones which overlie or protect important viscera, such as the brain and spinal cord, are of course particularly dangerous sites of attack.

THE ORGANISM

The staphylococcus appears to be the organism encountered in more than 80 per cent. of cases of acute osteomyelitis. It is an unfortunate preponderance, because a general staphylococcal infection is at all times a most serious matter. A streptococcal septicæmia either proves fatal within a short period or a complete recovery is made, but a staphylococcal septicæmia may continue for months or even for years, exhibiting phases of remission and exacerbation until the patient succumbs from exhaustion or dies as the result of a metastatic abscess in some vital part. I do not mean to suggest that staphylococcal septicæmias are necessarily fatal, but they are among the most intractable and treacherous of the general infections, and there is no doubt that the death-rate from staphylococcal osteomyelitis is considerably higher than that from any other type of bone infection. In my own experience, every fatal case of osteomyelitis which has come under my observation has been staphylococcal in type.

I do not think we need attach much importance to the individual strains of staphylococci as indicated by pigment reaction, for mutation is constantly occurring, but, if the property of hæmolysis is shown, the position is ominous, and I have found that a hæmolytic staphylococcal osteomyelitis is rarely recovered from. The gravity of staphylococcal infection is intensified by the fact that specific serum therapy has proved disappointing. In streptococcal disease dramatic results have been reported from serum therapy, and now the success of prontosil has brought new hope in these infections. I have given various types of serotherapy a patient trial in staphylococcal infections, but I cannot say that I have ever been satisfied that benefit has resulted. It is probable that each strain of staphylococcus demands its specific serum, and evidence of this is afforded by the fact that the most efficient means of counteracting a staphylococcal septicæmia seems to be a specific immuno-transfusion.

THE GENERAL REACTION

The general reaction of the patient is probably the most significant indication of the immediate prognosis. I have spoken of the type of patient in which a profound toxæmia dominates the clinical picture, and I have pointed out how serious is the outlook in such a case. In more detail the disconcerting signs are a pulse-rate which is out of proportion to the temperature, a dry, furred tongue, pronounced distaste for food, diminution in the output of urine, and a state of mental apathy in which there are intervals of delirium. With such a state of affairs the position is indeed grave, and in most cases it foreshadows a fatal result.

THE BLOOD PICTURE

Linked with the general reaction and in some ways an index of its response are the changes which are noted in the blood. Two are of particular significance, the white cell count with a record of the differential proportions, and a red cell count suggesting, as it may, the existence of a hæmolytic change.

A white cell count should be made at intervals throughout the early stages of the illness, and, if it indicates a leucocytosis exceeding 20,000 cells per c.cm., with a polymorphonuclear percentage in excess of the normal (75 per cent.), the finding may be accepted as a favourable augury. A falling red cell count is not seen in the early stage of the illness; it is generally about the tenth day that it first makes its appearance, but once established it is apt to develop rapidly, and the diminution in the numbers of red blood-cells is accompanied by a proportional reduction of the hæmoglobin.

Hæmolytic strains among staphylococci are less common than among streptococci, but when they occur they are apt to be associated with a grave prognosis. These are the types of infection which are apt to linger over a long period and, though blood transfusion may temporarily improve the condition and outlook, there is a tendency to repeated relapse.

THE URINE

The maintenance of the normal urine output, and particularly an increased volume, are encouraging signs. A progressive fall in the daily output must be regarded with apprehension, and we have noted on several occasions that the state of oliguria is apt to coincide with a falling red cell count. The combination of events is ominous, and, if it continues to develop in spite of treatment, the outlook is well-nigh hopeless.

Albumin is sometimes noted in the urine in small amount in the acute phases of the disease, but, unless the amount is considerable, or it persists unduly, the sign has no serious significance. It appears to be the result of a mild glomerular nephritis, but in the great majority of cases it disappears early and spontaneously, leaving no serious or permanent defect.

Hæmaturia may also be encountered, particularly in young children, but this is merely a passing phase of no particular import.

The Relationship of Operation to Prognosis

Surgical interference, its nature, and the time period at which it is employed, has an important bearing upon prognosis. As I have said the prelude to osteomyelitis is a septicæmia, and the focus in the bones is a local deposit of the general infection. It has been described as a fixation abscess, and in some respects the description is an apt one; at any rate, in so far as it is an area of acute inflammatory reaction it generates such antibacterial products as must increase the resistance of the individual and in some measure counteract the general infection. If we accept this appreciation of the disease the significance of operation becomes obvious, for, if we operate at such a stage as to interfere with the development of the local process, or if we adopt measures so radical that the beneficial influences of the focus are eliminated, the effect is definitely harmful. The prognosis is improved if we have the courage to delay operation until the focus is reasonably well established, and, having chosen the most opportune time, to restrict the operation to one involving the minimum of interference and yet securing drainage and relief of tension.

Looking back on my own experience, I realise that too often the prognosis was affected adversely by what I now regard as errors of judgment—unreasonably early operation, or on the other hand, unduly radical interference, perhaps resection of the infected bone or curetting of the marrow. I am satisfied that the adoption of less drastic measures has improved the prognosis.

The Local Condition

Apart from the life and general well-being of the patient, the prognosis of the limb as a fully functioning unit has to be considered. This is imperilled under two conditions: (1) when the related joint is invaded by the infection, and (2) when the epiphyseal cartilage is affected to such an extent that subsequent growth is interfered with. The first consideration (joint invasion) is intimately associated with the relation which the synovial reflection bears to the metaphysis. If the reflection extends over the metaphysis of the bone, as is the case in the lower end of the femur, secondary joint infection is a possibility which has always to be taken into account and the joint is liable to be permanently damaged. The second condition (interference with subsequent growth) is relatively uncommon when one considers how intimate is the association between metaphysis and epiphyseal cartilage, even in the presence of extensive disease subsequent shortening of the limb is an exceptional event.

It occasionally happens that osteomyelitis necessitates amputation of the limb. This tragic event may be demanded: (1) in the acute stages of the disease when the toxæmia from the infected area is so intense as to threaten life, and in (2) the late phase of the disease, when, as the result of joint stiffening, shortening, and multiple discharging sinuses, it may be considered advisable to sacrifice the limb rather than to maintain an appendage which is useless from the functional standard and a menace to general health.

JOHN FRASER, M.C., M.D., Ch.M., F.R.C.S. Edin.
Regius Professor of Clinical Surgery,
University of Edinburgh.

THE SERVICES

ROYAL NAVAL MEDICAL SERVICE

Surg. Comdrs. R. W. Higgins to *Victory* for R.N.B., and to *Queen Elizabeth*; W. A. Jolliffe to *Resolution*; and D. H. Kernohan and M. S. Moore to *Drake* for R.N.B.

Surg. Lt.-Comdrs. T. W. Froggatt to *President* for course; A. L. Moorby to *Rodney*; and T. B. Lynach to *Victory* for R.N.B.

Surg. Lts. F. Bush to *Grenville*; G. A. M. Smith to *Drake* for R.N.B.; and F. W. Chippindale to *Keith*.

Surg. Lt. (D) A. F. Ferguson to *Royal Oak*.

ROYAL NAVAL VOLUNTEER RESERVE

Surg. Comdr. H. O. Martin to *Drake* for R.N.B.

Surg. Lt.-Comdr. A. Elliott to *Furious*.

Surg. Lts. W. S. Miller to *Rodney*; G. P. McCullagh to *Iron Duke*; and D. R. Goodfellow to R.N. Hospital, Haslar.

Proby. Surg. Lts. H. B. Howell to *Ramillies* and G. L. Foss to *Nelson*.

Proby. Surg. Sub-Lts. R. A. Mogg promoted to Proby. Surg. Lt. and R. A. Stenhouse to *Courageous* for training.

ROYAL ARMY MEDICAL CORPS

Short Service Commissions: Lt. (on prob.) J. F. Wilson is restd. to the estabt.

Lts. G. M. Lewis and H. Ferguson relinquish their temporary commissions.

SUPPLEMENTARY RESERVE OF OFFICERS

R. D. Menzies to be Lt.

ARMY DENTAL CORPS

Short Service Commissions: 2nd Lt. O. B. Stibbs, from Supp. Res. of Off., R.A.S.C., to be Lt. (on prob.).

TERRITORIAL ARMY

Capt. A. McDowall to be Maj.

Capt. G. Lyon-Smith resigns his commission.

Lts. R. W. D. Turner and J. J. M. Brown to be Capts.

ROYAL AIR FORCE

Squadron Leader T. R. S. Thompson to R.A.F. Station, Northolt, for duty as Medical Officer.

Flying Officers J. C. Bowe to R.A.F. Depôt, Uxbridge; H. D. Conday to R.A.F. Station, Abingdon; R. F. Courtin to R.A.F. Station, Manston; E. W. R. Fairley to Central Flying School, Upavon; S. G. Gordon to No. 7 Flying Training School, Peterborough; E. B. Harvey to R.A.F. Station, Wyton; J. R. R. Jenkins to No. 5 Flying Training School, Sealand; V. D. Jones to No. 3 Flying Training School, Grantham; D. S. M. MacArthur to R.A.F. Station, Andover; R. S. B. McClean to R.A.F. Station, Pembroke Dock; I. K. Mackenzie to R.A.F. Station, Driffield; E. J. Moynahan to Medical Training Depôt, Halton; J. H. Neal to No. 1 Flying Training School, Leuchars; R. C. O'Grady to No. 11 Flying Training School, Wittering; R. M. Outfin to No. 6 Flying Training School, Netheravon; R. H. Pratt to Home Aircraft Depôt, Henlow; J. G. Rountree to No. 10 Flying Training School, Ternhill; D. J. Sheehan to R.A.F. Station, Finningley; and D. G. Smith and F. L. Whitehead to No. 9 Flying Training School, Thornaby.

INDIAN MEDICAL SERVICE

The Commander-in-Chief of the Army in India has made the following appointments at Army Headquarters, Simla: Maj. S. C. H. Worseldine, as additional medical officer, staffs and establishments, and Maj. J. H. G. Hunter, R.A.M.C., to be D.A.D.M.S. while Maj. P. F. A. Grant, O.B.E., is on combined leave out of India.

Lt. K. I. E. McLeod is secd. while holding a hospital appointment.

Indian Medical Department.—Asst. Surgs. (1st Cl.) to be Lts. (Sen. Asst. Surgs.): T. S. Johnstone, M. C. R. Rodgers, and D. M. Frost.

SPECIAL ARTICLES

ENTERIC FEVER IN MILK-BORNE AND WATER-BORNE EPIDEMICS

A COMPARISON OF AGE- AND SEX-INCIDENCE

BY A. BRADFORD HILL, D.Sc., Ph.D. Lond.

READER IN EPIDEMIOLOGY AND VITAL STATISTICS IN THE UNIVERSITY OF LONDON AT THE LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE; AND

K. MITRA, M.B., D.P.H. Calcutta, D.T.M. & H. Eng.

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THE determination of the origin of an epidemic of typhoid fever is based, broadly speaking, upon two steps. The first piece of evidence required is that of persons suffering from the disease, all, or some very large proportion, have shared the same water, milk, or other food-supply; that the attack rate is very much higher on persons with this common supply of a commodity than on the non-consumers in the same or adjacent areas. Such a feature of the outbreak strongly suggests its origin to lie in this common supply. But the evidence is not logically conclusive. It is possible that the group of consumers is differentiated from the non-consumers by some other relevant characteristic. The further evidence required is that the common supply of the commodity was in fact infected, or was clearly liable to be infected, and that the probable or actual date of its contamination tallies with the infection of consumers, allowing, of course, for the natural incubation period of the disease. In other words we must endeavour to show a close correlation in space between the consumption of the commodity and the incidence of disease, and a close correlation in time between infection of the supply and the occurrence of the cases of the disease. Such a conclusive chain of evidence is often hard to come by and it is important to see whether there are any other epidemiological characteristics of an outbreak which will afford indications or supporting evidence of its origin. *A priori* reasoning suggests that a milk-borne epidemic may differ from a water-borne epidemic in one, or perhaps two features—namely, the age- and sex-distributions of the persons attacked. On the average children are heavier consumers of milk than adults and of the latter probably females are heavier consumers than males. The consumption of water seems likely to be less differentiated; probably adults consume, in tea and coffee, more than children though this would relate only to boiled water. It is therefore possible that a milk-borne epidemic may be characterised by a relatively high proportion of the attacked persons belonging to the ages of childhood and to the female sex. On the other hand such *a priori* reasoning comes acutely to grief with undulant fever. Weldon Dalrymple-Champneys (1935) says that "all the evidence I have collected during the last seven years points to the consumption of cow's milk as the commonest mode of infection though I will freely admit that in a number of cases the ætiology remains at present extremely obscure." Yet of 255 patients of his series whose sex was known, 170 were males and only 85 females; of 250 whose age was known only 9 were under ten years, only 3 were under five years, and 43 per cent. were between the ages of thirty and forty. This great preponderance of males over females has, he says, been observed in nearly every country in which the disease has been studied, and its explanation is just as obscure as is that of the low incidence in childhood. This distribution of incidence makes one think, it has been said, "of beer, beef, or syphilis, but not of milk" (The Medical Officer, 1936). The recorded incidence is in fact in inverse ratio to the apparent risk of infection. With enteric fever there is, however, a widespread belief that in the milk-borne outbreaks the incidence of attack falls with peculiar severity upon the young and upon the female sex. For example the outbreak in Llandudno and Conway in 1908–09 is referred to by H. H. Scott (1934) as one "of an explosive nature, involving children more than adults, females more than males, and of the males a greater incidence on those below the age of 15 years—points in favour of what we have come to recognise as characters of a milk-borne infection." In his account of the Hertfordshire milk-borne epidemic in 1927 he also stresses the importance of the age- and sex-incidence of cases. "Of the total, 70 were under eleven years old and 113 under twenty-one—i.e., 68 per cent. of the whole; only 53 were over twenty-one years. As regards sex: of those under twenty-one years, 57 were males and 56 females and of the children under eleven years 33 males, 36 females. Among the adults, females attacked were more than twice as many as males, 36 of the former to 17 of the latter." Similarly in the milk-borne epidemic of paratyphoid in the urban district of Epping (Essex) there were at ages under twenty-one, 89 males attacked and 86 females; at ages above twenty-one there were 27 males to 58 females (Greenwood, 1935). In this outbreak just over one-half of the recorded cases were children under the age of fifteen. (This epidemic is absent from the Tables that follow, the particulars being overlooked until after the calculations had been made.) Similar comments are to be found in the published accounts of other epidemics, and in the report of the United States Public Health Service on the importance of milk as a factor in the causation of outbreaks of disease (1927), one of the characteristics of the milk-borne epidemic is stated to lie in the fact that "children, women, and well-to-do families often suffer higher attack rates than men and persons in poorer families." On the other hand Picken (1935) has suggested that "the usual view that milk-borne typhoid has a bias towards the young . . . has not really been substantiated." This conflict of opinion and the apparent absence of conclusive evidence, one way or the other, as well as the curious incompatibility of the recorded incidence of undulant fever with the *a priori* reasoning, led us to consider whether the "usual view" of the characteristics of milk-borne typhoid could be put to the test by means of an analysis of published data relating to epidemics of this disease which had been attributed to water or to milk.[1]

Isolated instances from particular epidemics are merely conflicting. For example, in the St. Marylebone outbreak of milk-borne enteric, 1873, the following cases may be quoted (from Scott's (1934) summary of the original report). In a family of 11 adults and 3 children, 2 of the latter were infected, but only 1 of the adults. In another house a child and the servant who "was a great milk drinker"

[1] A somewhat similar study was made in 1929 by Godfrey in America which is referred to later in the text. Since the present paper was completed a study has been published by Picken (Brit. Med. Jour., June 27th, 1936, p. 1291) dealing more widely with milk-borne epidemics but less intensively with regard to typhoid. He concludes that the case for differential age- and sex-incidence in the latter is not very convincing.

were the only sufferers. On the other hand in one house where there was the mistress, two children, and a maid, the adults, who habitually drank the milk untreated, both developed enteric fever, while the children who drank it only after it had been boiled escaped. And one cannot refrain from quoting the case of the family in which "Nemesis visited the butler who had beer money but saved it and drank milk instead." The incidence of attack is correlated as it must be (apart from contact cases) with *some* consumption of the infected milk, but in one of these particular families this led specifically to the adults succumbing while the children escaped. If the epidemic of the milk-borne typhoid is clearly differentiated from the water-borne epidemic in the age- and sex-distribution of the persons attacked we must, therefore, seek for this differentiation in the epidemic as a whole. In individual families exceptions, such as shown above, must occur. Consequently our aim in this study has been to see whether in a series of milk-borne epidemics there is usually or invariably an excess of children and women amongst the attacked in comparison with the incidence observed in a series of water-borne epidemics. The actual differences in age- and sex-incidence in the two series may be, naturally, somewhat blurred by the inevitable inclusion of secondary contact cases with the directly water- or milk-borne infections.

Material Analysed and the Mode of Analysis

A search of the literature has enabled us to extract information of the type we need relating in all to 77 epidemics of typhoid or paratyphoid in Great Britain or North America (a list as extensive as possible but which makes no pretence to be exhaustive of the detailed accounts we require) between 1870 and the present day. Of these epidemics, 28 were attributed by the original investigators to an infected water-supply, 31 to an infected milk-supply, 7 to the consumption of other infected foods, shell-fish, &c., 5 were designated "contact" epidemics, and in 6 no clear causal agent was incriminated. This differentiation of the origin of each epidemic we have accepted though we have, of course, taken care to observe that no epidemic was originally attributed to milk or water on the basis of the age- or sex-distribution of the cases recorded. We have also endeavoured to include only outbreaks that occurred in what we may term "normal" populations and to exclude those limited to peculiar populations such as exist in institutions, hotels, and the like. We likewise excluded one milk-borne epidemic in which the milk-supply was of a type (Certified) which would be practically entirely confined in its consumption to children. Such an epidemic must inevitably (and naturally did) show a very high proportion of child patients. Our interest lay in the relative effects of the infection of an "ordinary" milk-supply amongst an "ordinary" population compared with the effects of the infection of a water-supply in a similar medium. Our analysis relates only to the 31 milk-borne and the 28 water-borne epidemics. The information relating to each of these epidemics is not naturally equally detailed, both the age- and sex-distribution not always being available and the former being given in different degrees of fineness. We have made the age- and sex-grouping comparable for the milk- and water-borne epidemics to the utmost extent and the Tables that follow show the number of epidemics which we could use for each form of comparison. The paucity of our material is largely due to the investigators of epidemics neglecting to collect or publish sufficient details of the sex and age of patients. For the purposes of such a study as this the numbers of cases in five-yearly age-groups are the desiderata. We have had to exclude some epidemics because the information was only given in much wider age-groups. We have found no information which would enable us to compare the incidence on "well-to-do" classes in milk- and water-borne outbreaks.

The actual attack *rates* on the two sexes and at different ages we have, in the absence of any knowledge of the age- and sex-constitutions of the populations exposed to risk, been unable to calculate. Even if the population of an area, town or rural district, were known there seemed to us to be rarely any justification for using it as a basis for the calculation of such rates, since the epidemic might be too localised for the whole population to be a proper measure of the numbers effectively exposed to risk, especially in milk-borne epidemics where the incidence (apart from the contact cases) must fall on a limited section of the community—namely, the consumers of that particular supply. In our comparisons of milk- and water-borne outbreaks we are, therefore, limited to proportional rates—i.e., the proportions of the total recorded cases that belonged to either sex or to certain age-groups. In specific epidemics these proportions must be influenced to an unknown extent by the age- and sex-constitution of the population exposed to risk. Where, for instance, the population is composed more of males than females there is likely to be a high proportion of males amongst the attacked although the attack rates may be equal for the two sexes, or even higher for the females. But taking the epidemics *as a whole* we could see no reason to believe that this factor would vitiate the broad comparison of the milk- and water-borne epidemics. If indeed the former were more prone to occur in populations containing an unduly high proportion of children and females, that would not be a vitiating factor but evidence of the characteristic we wanted to measure. Between one water-borne epidemic and another, between one milk-borne epidemic and another, and between single epidemics of the two types, however, the differences observed may clearly be due in part, perhaps largely, to differences in the age- and sex-constitutions of the populations in which the epidemics developed.

Sex-incidence

In Table I. is shown the proportion of females of all ages who were attacked in different milk- and water-borne epidemics. Taking the figures for the epidemics as a whole there is a slight excess of females over males in the milk-borne outbreaks, for the proportion of females in these is 53 per cent. to 47 per cent. males; in those that were water-borne there is a slight excess of males, the proportion of females being about 49 per cent. and males 51 per cent. The variability of the sex-ratio in both series is clearly very considerable, ranging in individual outbreaks of both kinds from just over 30 per cent. of females to some 70 per cent. of females amongst the attacked. The distribution of the percentages, however, does suggest a somewhat greater predilection of the milk-borne epidemics for the female sex as the figures of Table II. show. The numbers of females of all ages who were attacked exceeded or just equalled the number of males in 41 per cent. of the water-borne outbreaks, while in the milk-borne outbreaks this proportion was 66 per cent. In 4 of the 24 water-borne epidemics the proportion of the females amongst the attacked was as low as 30–40 per cent., while in

only 1 of the 18 milk-borne epidemics was a proportion as low as this observed. These differences are suggestive though not significant in the formal statistical sense.

In Table III. the sex proportion is given, for those epidemics which were reported in sufficient detail, for three age-groups 0 to 4, 5 to 14, and 15 years and over. This comparison should provide more satisfactory evidence of sex differences in risk of attack than the previous figures relating to all ages, since one may presume that milk consumption is not likely to be differentiated by sex in childhood but may well be so in adult life. Taking first each set of epidemics, water-borne and milk-borne, as a whole, the results are these. In early childhood, 0–4 years, the sex-ratio in the two sets is identical. In the 14 water-borne epidemics (one had no cases at these ages) 45 per cent. of the patients were females and 55 per cent. were males; in the 10 milk-borne epidemics (one also had no cases at these ages) the corresponding figures were 44·8 per cent. females and 55·2 per cent. males. Proportionately females are attacked in both groups at a rather lower rate than males, but this difference may be partly a reflection of the sex-ratio in the populations at risk; there are usually more males in the population than females at early ages, so that the actual attack rates may not differ substantially. The England and Wales census of 1931 gives 50·5 per cent. males and 49·5 per cent. females at ages 0–4, a smaller difference than is apparent in these proportional attacks.

TABLE I.—*Sex-incidence at All Ages*

WATER-BORNE EPIDEMICS.			MILK-BORNE EPIDEMICS.		
Serial No. of epidemic.	Total No. of cases.	Females as percentage of total cases.	Serial No. of epidemic.	Total No. of cases.	Females as percentage of total cases.
W. 9	50	74·0	M. 3	49	69·4
W.12	231	60·2	M.20	52	63·5
W.23	80	57·5	M. 1	97	62·9
W. 4	506	56·9	M. 5	10	60·0
W. 5	42	54·8	M.30	80	58·8
W.27	270	53·0	M.19	83	57·8
W.20	275	52·0	M. 7	25	56·0
W. 2	330	50·6	M.21	166	55·4
W. 1	60	50·0	M.26	71	54·9
W.29	28	50·0	M.22	70	51·4
W.17	436	49·8	M. 2	200	50·3
W.10	369	49·1	M.13	34	50·0
W.26	397	48·9	M.11	105	49·5
W. 6	214	48·6	M.12	32	46·9
W.13	44	47·7	M. 9	74	46·0
W.21	193	47·7	M.15	55	43·6
W.15	124	46·8	M. 8	69	40·6
W.19	165	45·5	M. 6	22	36·4
W.11	1008	43·6	..	..	..
W. 3	141	43·3	..	..	..
W.25	73	39·7	..	..	..
W. 7	28	39·3	..	..	..
W.18	518	39·2	..	..	..
W. 8	77	33·8	..	..	..
All epidemics	5659	..	..	1294	..
Mean percentage	Unweighted	49·3	..	..	53·0
	Weighted	48·4	..	..	53·6
Standard deviation	Unweighted	8·0	..	..	8·3
	Weighted	12·9	..	..	7·1
Coefficient of variation	Unweighted	16·3	..	..	15·7
	Weighted	26·6	..	..	13·2

At ages 5–14 years the sex-ratio of the cases remains virtually unchanged in the water-borne epidemics, the percentage of females being 44·8 and of males 55·2, virtually the same as at ages 0–4. In the milk-borne epidemics, however, the percentage of females rises to 52·5 and the percentage of males falls to 47·5, so that proportionately in such epidemics more females than males are attacked at these ages than at ages 0–4 in the same kind of epidemics or than in water-borne epidemics at ages 5–14.

At ages 15 and over the proportion rises in the water-borne epidemics to 49 per cent. females and falls to 51 per cent. males, or to practical equality between the two sexes. The real attack rate is probably higher on the males, as at adult ages females exceed males in the population. (At the England and Wales census of 1931 the percentages were 47 males and 53 females.) In the milk-borne epidemics the proportion of females rises more sharply so that 58·7 per cent. of the cases are females and only 41·3 per cent. are males. These figures clearly suggest that the sex-ratio of cases does not differ between the two sets of epidemics, milk-borne and water-borne, in early childhood, but as age advances it becomes somewhat more unfavourable to the female sex in the milk-borne epidemics.* This result therefore supports the hypothesis that adult women as greater consumers of milk should show a higher incidence of attack than adult males in epidemics conveyed by this medium. The difference between the two epidemic groups at ages 15 and over is quite appreciable, for in the water-borne outbreaks males exceed females by 2 per cent. (51 to 49) and in those that were milk-borne females exceed males by 17·4 per cent. (58·7 to 41·3). When we advanced our definition of an adult from 15 years and over to 20 years and over, we found the difference between the water- and milk-borne epidemics was still slightly larger. The proportions of the sexes attacked in the 13 water-borne outbreaks for which we could make this calculation were 50·9 per cent. females to 49·1 per cent. males. In 9 milk-borne epidemics there were 61·7 per cent. females to only 38·3 per cent. males. There was still practically sex equality of the attacked in the water-borne epidemics, but a considerable excess of female patients in those that were milk-borne.

TABLE II

Percentage of cases that were females.	WATER-BORNE.		MILK-BORNE.	
	Epidemics with given percentage of females.	Percentage of all epidemics.	Epidemics with given percentage of females.	Percentage of all epidemics.
30–	4	17	1	6
40–	10	42	5	28
50–	8	33	8	44
60 and over	2	8	4	22
Total	24	100	18	100

In Table IV. the epidemics of Table III. are put in broad groups. The numbers on which these percentages are based are admittedly very small but they do at least suggest a very considerable difference. In nearly half of the milk-borne epidemics 65 per cent. or more of the patients were females while only 13 per cent. of the water-borne epidemics fell into this category. On the other hand in 80 per cent. of the water-borne epidemics there were less than 55 per cent. female patients compared with

* Part of the considerable variation of the sex-ratio within the two groups may be due, as previously pointed out, to differing sex constitutions in the populations exposed to attack in the different epidemics. If we presume that in the *totals* of the two groups the populations exposed are equivalent, then by the ordinary test of significance the difference in sex proportions between water- and milk-borne outbreaks is 2·3 times its standard error at ages 5–14, and 3·5 times its standard error at ages 15 and over.

only 36 per cent. of the milk-borne outbreaks in this category. (Made into a fourfold table, below 55 and above 55 per cent. of females, the values give a χ^2 of 3·43 and P equals 0·06 so that the differences between the two sets do not quite reach the formal limit at which the hypothesis of chance may with confidence be rejected.)

In spite of these suggestive differences between the *total experiences* it is quite clear, from the very great variability apparent between the different epidemics, that a high or low proportion of female patients in a *particular* epidemic could be used as evidence of the medium of that epidemic only with much circumspection. In two of the larger milk-borne epidemics of Table III., with respectively 100 and 59 cases at ages 15 and over, the proportion of females amongst the attacked was only 51 per cent.—i.e., nearly sex equality—while in a large water-borne outbreak with 370 cases at these ages, the proportion of females was as high as 60 per cent. In the absence of any knowledge of the sex-ratio in the exposed to risk, we do not, of course, know whether the actual attack *rates* in these separate epidemics were in fact relatively favourable or unfavourable to females. But in the consideration of the medium of an epidemic by a field investigator that knowledge of the sex and age constitution of the population at risk will often be absent, and in practice the interpretation of the sex difference as evidence of the medium would often have to depend upon such proportional rates as are given in Table III.

AGE-INCIDENCE

In Table V. we have set out the age-distribution of cases, regardless of sex, in 22 water-borne and 23 milk-borne epidemics. Taking these epidemics as two broad groups we find only very small differences between the percentages registered in the three age-groups; there is in fact no difference at all between the proportions in the milk-borne and water-borne outbreaks if we take 0–14 years as years of childhood and 15 years and over as those of "adult life." The proportion of all those attacked who were of ages 15 and above was 56·4 per cent. in the water-borne epidemics and 55·5 per cent. in the milk-borne epidemics; at ages 5–14 the corresponding percentages were 36·6 and 33·3 and at the ages of early childhood, 0–4 years, they were 7·0 and 11·2. There is, it will be seen, a slightly higher proportion of children at ages 0–4 amongst those attacked in the milk-borne epidemics but the difference is really very small, and the variability in the epidemics is considerable.

TABLE IV

Percentage of females at ages 15 and over.	WATER-BORNE.		MILK-BORNE.	
	Epidemics with given per cent. of females.	Per cent. of all epidemics.	Epidemics with given per cent. of females.	Per cent. of all epidemics.
Below 45 ..	4	27	1	9
45–	8	53	3	27
55–	1	7	2	18
65 and over	2	13	5	46
Total ..	15	100	11	100

In Table VI. the epidemics are grouped according to the proportions belonging to each age-group. There are more milk-borne than water-borne epidemics in which over 10 per cent. of all the patients belonged to the age-group 0–4 years, ten of the former against three of the latter; correspondingly there are fewer of the milk-borne than the water-borne outbreaks in which only 0–5 per cent. of the patients were of these ages, four against seven. This distribution suggests that in the milk-borne epidemic there is likely to be a higher proportion of very young children amongst the patients than in the water-borne epidemic, but it must be noted that the observed differences between the two sets at ages 0–4 in Table VI. are not more than might quite easily have occurred by chance (χ^2=3·28, P is slightly less than 0·20) and the "overlap" is considerable. In fact in two small milk-borne epidemics no patients at all at ages 0–4 were reported, while in two water-borne epidemics the percentage of patients at these ages was over 20.

At ages 5–14 the distributions in Table VI. are practically identical in the two groups. At ages 15 years and over there are fewer milk-borne than water-borne outbreaks with a very high proportion (over 60 per cent.) of adult patients but the difference is again very small.

Confining attention to the ages of childhood, 0–14,

TABLE III.—*Sex-incidence at Different Ages*

Serial No. of epidemic.	WATER-BORNE. Age .. 0–4		5–14		15 and over.		Serial No. of epidemic.	MILK-BORNE. Age .. 0–4		5–14		15 and over.	
	No. of cases.	Per cent. females.	No. of cases.	Per cent. females.	No. of cases.	Per cent. females.		No. of cases.	Per cent. females.	No. of cases.	Per cent. females.	No. of cases.	Per cent. females.
W. 1	5	40·0	25	52·0	30	50·0	M. 2	25	40·0	75	58·7	100	51·0
W. 2	20	60·0	111	52·3	199	48·7	M. 3	13	61·5	21	66·7	15	80·0
W. 3	29	37·9	67	38·8	45	53·3	M. 5	2	50·0	5	60·0	3	66·7
W. 4	11	17·5	125	49·6	370	60·0	M. 6	3	33·3	0	0·0	19	36·8
W. 5	3	33·3	13	30·8	26	69·2	M. 7	0	0·0	13	61·5	12	50·0
W. 7	1	100·0	9	22·2	18	44·4	M. 9	7	14·3	23	26·1	44	61·4
W. 8	5	40·0	57	31·6	15	40·0	M.11	10	60·0	36	44·4	59	50·9
W. 9	4	100·0	18	77·8	28	67·9	M.15	10	40·0	20	55·0	25	64·0
W.10	12	33·3	119	47·9	238	50·4	M.19	9	44·4	29	48·3	45	66·7
W.11	84	40·5	315	41·9	609	44·8	M.20	16	50·0	17	58·8	19	79·0
W.13	0	0·0	13	46·2	31	48·4	M.30	10	40·0	26	50·0	44	68·2
W.15	10	70·0	48	37·5	66	50·0	..	..	..	..	..	..	..
W.18	48	43·8	202	40·1	268	37·7	..	..	..	..	..	..	..
W.19	19	42·1	114	43·9	32	53·1	..	..	..	..	..	..	..
W.20	18	55·6	124	54·8	133	48·9	..	..	..	..	..	..	..
Total cases and weighted.							Total cases and weighted.						
Means..	269	45·0	1360	44·8	2108	49·0	Means..	105	44·8	265	52·5	385	58·7

we find that of the 2395 cases at these ages in the 22 water-borne epidemics 16·2 per cent. were at ages 0–4 and 83·8 at ages 5–14. In the 23 milk-borne epidemics the corresponding percentages were 25·2 and 74·8, showing as before a slight excess of very

TABLE V.—*Age-incidence*

WATER-BORNE.					MILK-BORNE.				
Serial No. of epidemic.	Total cases.	Percentage of total cases at ages—			Serial No. of epidemic.	Total cases.	Percentage of total cases at ages—		
		0–4	5–14	15 +			0–4	5–14	15 +
W. 1	60	8·3	41·7	50·0	M. 1	97	6·2	37·1	56·7
W. 2	330	6·1	33·6	60·3	M. 2	200	12·5	37·5	50·0
W. 3	141	20·6	47·5	31·9	M. 3	49	26·5	42·9	30·6
W. 4	506	2·2	24·7	73·1	M. 4	62	4·8	17·8	77·4
W. 5	42	7·1	31·0	61·9	M. 5	10	20·0	50·0	30·0
W. 6	214	3·7	22·0	74·3	M. 6	22	9·1	13·6	77·3
W. 7	28	3·6	32·1	64·3	M. 7	25	0·0	52·0	48·0
W. 8	77	6·5	74·0	19·5	M. 8	69	11·6	20·3	68·1
W. 9	50	8·0	36·0	56·0	M. 9	74	9·5	31·1	59·4
W.10	369	3·3	32·2	64·5	M.10	91	27·5	39·5	33·0
W.11	1008	8·3	31·3	60·4	M.11	105	9·5	34·3	56·2
W.12	231	7·4	44·1	48·5	M.12	32	0·0	40·6	59·4
W.13	44	0·0	29·5	70·5	M.13	34	8·8	55·9	35·3
W.14	109	1·8	52·3	45·9	M.14	179	7·8	35·8	56·4
W.15	124	8·1	38·7	53·2	M.15	55	18·2	36·4	45·4
W.16	405	10·4	44·2	45·4	M.16	42	7·1	28·6	64·3
W.17	436	8·5	52·5	39·0	M.17	99	1·0	31·3	67·7
W.18	518	9·3	39·0	51·7	M.18	23	13·0	43·5	43·5
W.19	165	11·5	38·2	50·3	M.19	83	10·9	34·9	54·2
W.20	275	6·5	45·1	48·4	M.20	52	30·8	32·7	36·5
W.21	193	6·8	23·8	69·4	M.26	71	5·6	21·1	73·3
W.28	164	0·0	23·2	76·8	M.27	42	9·5	9·5	81·0
..	..	..	..	..	M.30	80	12·5	32·5	55·0
Total	5489	..	..	..	Total	1596	..	..	..
Mean.					Mean.				
Unweighted ..		6·7	38·1	55·2	Unweighted		11·4	33·9	54·7
Weighted ..		7·0	36·6	56·4	Weighted ..		11·2	33·3	55·5
Standard deviation.					Standard deviation.				
Unweighted ..		4·4	15·7	14·1	Unweighted		8·1	11·4	15·1
Weighted ..		4·0	10·0	12·1	Weighted ..		6·7	8·8	12·6
Coefficient of variation.					Coefficient of variation.				
Unweighted ..		65·4	42·8	25·5	Unweighted		71·1	26·4	27·6
Weighted ..		57·1	26·3	21·4	weighted ..		59·8	33·6	22·7

young children in the milk-borne outbreaks. Finally we have calculated the percentage age-distribution for each sex separately. Our analysis by sex showed that, on the average, adult females appeared proportionately more frequently than adult males in milk-borne compared with water-borne epidemics.

TABLE VI.—*Age-incidence*

Per cent. of total cases that were at ages 0–4.	Epidemics with given percentage.		Per cent. of total cases that were at ages 5–14.	Epidemics with given percentage.		Per cent. of total cases that were at ages 15 and over.	Epidemics with given percentage.	
	Water.	Milk.		Water.	Milk.		Water.	Milk.
0–	7	4	10–	5	6	20–	3	5
5–	12	9	30–	14	14	40–	9	11
10 and over.	3	10	50 and over.	3	3	60 and over.	10	7
Total	22	23		22	23		22	23

It was clear therefore that if there was a significant difference in age-distributions between water- and milk-borne epidemics, this difference would be more distinct amongst males than amongst females. The data available were those given in Table III. and its further analysis is shown in Table VII. In the water-borne epidemics 7·5 per cent. of the attacked males belonged to the age-group 0–4; in the milk-borne epidemics this percentage was more than twice as high—namely, 16·9. In the water-borne epidemics 6·9 per cent. of the attacked females belonged to the age-group 0–4 while in the milk-borne outbreaks the percentage was 11·4, this figure being 65 per cent. in excess of the 6·9 in the water-borne outbreaks. On the average it, therefore, appears that the milk-borne epidemic is characterised by some difference, though relatively small, in the age-incidence of the patients of the two sexes, the males showing a higher proportion than the females of cases in early

TABLE VII.—*Age- and Sex-incidence*

—	Age-group.							
	WATER-BORNE.				MILK-BORNE.			
	0–4	5–14	15 and over.	Total.	0–4	5–14	15	Total.
Male cases.	148	751	1075	1974	58	126	159	343
Per cent.	7·5	38·0	54·5	100·0	16·9	36·7	46·4	100·0
Female cases.	121	609	1033	1763	47	139	226	412
Per cent.	6·9	34·5	58·6	100·0	11·4	33·7	54·9	100·0

childhood and a lower proportion of cases in adult life. This result is in accordance with figures published by Godfrey (1929). Comparing the age-incidence in epidemics attributed to milk with that of all typhoid cases in places of less than 200,000 persons in New York State, he found that children were more liable to attack in the milk-borne outbreaks but that this liability was largely due to an excess at ages under 5 years.

Summary and Conclusions

The general conclusions to which this study of water-borne and milk-borne typhoid leads us is that the latter behaves much more according to "expectation" than undulant fever. The hypothesis that a milk-borne disease should fall with greater frequency upon the ages of childhood, and amongst adults upon the female rather than upon the male sex, owing to differences in the consumption of milk, finds no support whatever in the available statistics of cases of undulant fever. The present analysis of the statistics of a number of epidemics of typhoid does, on the other hand, lead to results which are compatible with that hypothesis. In the early years of childhood we find no difference at all in the ratio of male to female patients between the water-borne and milk-borne epidemics. At such ages the milk consumption is unlikely to differ between the sexes. In the later ages of childhood, 5–14 years, we find no change in the sex-ratio of patients in the water-borne epidemics—i.e., as compared with the ratio at ages 0–4—but in epidemics attributed to milk the proportion of females attacked becomes a little higher than at ages 0–4. In adult life, either at 15 years and over or at 20 years and over, there is an approximate equality between the number of male and of female patients present in the water-borne epidemics, but in the milk-borne epidemics there is, *on the average*, a distinct excess of female over male patients. The sex, therefore, which it is reasonable to assume consumes more milk at adult ages appears at those ages with a greater proportional frequency amongst the attacked than in water-borne epidemics. Analysis by age

leads broadly, though less distinctly, to the same results. In the milk-borne epidemics, again *on the average*, a slightly higher proportion of the patients belong to the years of early childhood, and relatively fewer to the ages of adult life, than are observed in the water-borne epidemics. The age-group consuming most milk has a proportionately, *but only slightly*, higher incidence of attack than is observed in water-borne typhoid. As a corollary of the sex difference in adult life, this proportionately higher incidence in childhood in the milk-borne epidemics is more distinct amongst males than amongst females.

Although our figures are not in all cases extensive enough to enable us to accept the differences as proven, we think that they are sufficient to enable us to conclude that milk-borne typhoid does differ *on the average* somewhat but not profoundly from water-borne typhoid in its age- and sex-incidence. We have stressed "on the average" repeatedly because we find that the variability in the proportional age- and sex-incidence is very great from one epidemic to another whichever the medium of infection. We find water-borne epidemics with a high proportion of adult females amongst the attacked, and similar epidemics with a high proportion of children. Conversely we find milk-borne epidemics with a low proportion of children amongst the attacked or a high proportion of adult males. Some of these differences may be due to the fact that we do not know the age and sex constitution of the actual population exposed to risk and cannot, therefore, calculate attack rates. Clearly if a milk-borne epidemic occurs in a population containing a high proportion of adult males, a high proportion of the cases observed may be adult males although the real attack rate on the males may be lower than the attack rate on the relatively fewer adult females. Our analysis is necessarily limited to the proportional sex- and age-incidence. In particular epidemics also there will be special causes influencing the age- and sex-distribution. In one milk-borne outbreak, for instance, an appreciable part of the milk-supply went to "lunch wagons" and "stores," and thus affected a relatively high proportion of persons of ages 20–45. In one water-borne epidemic it is reported that children were in the habit of lying down in the roadway on their way from school to drink from an infected stream; this habit was more characteristic of the male sex than of the female, the latter having more respect than the former for their clothes. Such peculiarities must affect the age- and sex-incidence of attack. Finally, differences in the incidence of contact cases in different epidemics may play a part and blurr the distinction between water- and milk-borne outbreaks.

Owing therefore to the variability of the age and sex proportions of those attacked in the different epidemics, whether due to differences in the populations at risk or to such other causes as we have just mentioned, we conclude that their level in a particular epidemic would be very slender evidence of the probable medium of infection. We suggest that such features as a relatively high ratio of adult females to adult male patients, and a relatively high proportion amongst the attacked of both sexes, especially the males, of young children, should certainly direct special attention to the milk-supply. But it is quite possible that such features may be present in an outbreak of water-borne typhoid or be absent in one derived from infected milk. Their presence would be suggestive but very far from convincing evidence of the medium of infection.

REFERENCES

Medical Officer, May 16th, 1936, p. 194.

Dalrymple-Champneys, W.: Undulant Fever, with special reference to its clinical aspects in England and Wales, THE LANCET, 1935, ii., 1449.

Godfrey, E. S.: Amer. Jour. Pub. Health, 1929, xix, 257.

Greenwood, M.: Epidemics and Crowd Diseases: An Introduction to the Study of Epidemiology, London, 1935.

Picken, R. M. F.: Bull. of Hyg., 1935, x., 481.

Scott, H. H.: Some Notable Epidemics, London, 1934.

U.S.A. Pub. Health Rep. Supp. No. 62, 1927: Further Studies on the Importance of Milk and Milk Products as a Factor in the Causation of Outbreaks of Disease in the United States.

The following references relate to the epidemics for which we extracted information. They are given in order of the serial numbers that we attach to them, at the time of extraction of the details, merely for purposes of identification:—

Milk-borne

1 1916–1921 Report of M.O.H., Aberdeen.
2 1928 Jour. Prev. Med., ii., 49.
3 1926 Pub. Health, xxxix., 177.
4 1930 Amer. Jour. Pub. Health, xx., 137.
5 1916 Jour. Infect. Dis., xviii., 143.
6 1911–1912 Pub. Health, xxv., 444.
7 1912
8 1913 Rep. to L.G.B. on Pub. Health and Med. Subjects, New Series No. 83.
9 1912 Ibid., No. 59.
10 1874 Rep. of M.O., Privy Council and L.G.B., New Series No. 2, App. v., 92.
11 1874 Ibid., App. iv., 79.
12 1897 Pub. Health, x., 97.
13 1912 U.S.A., Pub. Health Rep., Wash., xxvii., 219.
14 1874 Rep. of M.O., Privy Council and L.G.B., New Series No. 2, 103.
15 1910 Rep. of L.G.B. on Pub. Health and Med. Subjects, New Series No. 28.
16
17 1912 Amer. Jour. Pub. Health, ii., 431.
18
19 1913 Ibid., iii., 486.
20 1925 Min. of Health, Rep. on Pub. Health and Med. Subjects, No. 30.
21 1928 Ibid., No. 53.
22 1913 Rep. to L.G.B. on Pub. Health and Med. Subjects, New Series No. 84.
23 1916 2nd Ann. Rep. of State Dept. of Health, Mass., 508.
24 1927 Med. Off., xxxviii., 8, and League of Nations, Monthly Epidem. Rep., vi., 451.
25 1925 Jour. Amer. Med. Assoc., lxxxiv., 251.
26 1909 41st Ann. Rep. of State Board of Health, Mass., 619.
27 1912 Jour. Amer. Med. Assoc., lviii., 1941.
28 1916 U.S.A. Pub. Health Rep., Wash., xxxi., 59.
29 1909 41st Ann. Rep. of State Board of Health, Mass., 624.
30 1931 Jour. Prev. Med., v., 465.
31 1932 Canad. Pub. Health Jour., xxiii., 503.

Water-borne

1 1901–1902 31st Ann. Rep. of M.O., L.G.B., App. A, 213.
2 1913 Jour. Infect. Dis., xii., 15.
3 1917 U.S.A. Pub. Health Rep., Wash., xxxii., 1306.
4 1911 Jour. Infect. Dis., ix., 410.
5 1929 Amer. Jour. Pub. Health, xix., 997.
6 1931 Ibid., xxi., 390.
7 1914 U.S.A. Pub. Health Serv., Pub. Health Bull. No. 65.
8 1912 Rep. of L.G.B. on Pub. Health and Med. Subjects, New Series No. 74.
9 1911 U.S.A. Pub. Health Rep., Wash., xxvi., 63.
10 1928 Jour. Prev. Med., ii., 49.
11 1905–1906 35th Ann. Rep. of M.O., L.G.B., App. A, 81.
12 1884 14th ditto, App. A, 112.
13 1914 Rep. to L.G.B. on Pub. Health and Med. Subjects, New Series No. 92.
14 1899–1900 29th Ann. Rep. of M.O., L.G.B., App. A, 181.
15 1892–1893 22nd ditto, App. A, 67.
16 1897–1898 27th ditto, App. A, 65.
17 1894–1895 24th ditto, App. A, 45.
18 1887–1888 17th ditto, App. A, 59.
19 1898–1899 28th ditto, App. A, 111.
20 1889–1890 19th ditto, App. A, 61.
21 1921 Jour. Infect. Dis., xi., 21.
22 1915 Ibid., xvi., 1.
23 1912 Ibid., x., 385.
24 1926 U.S.A. Pub. Health Rep., Wash., xxxv., 391.
25 1913 Ibid., xxviii., 291.
26 1922 Min. of Health, Rep. on Pub. Health and Med. Subjects, No. 12.
27 1933 Ibid., No. 69.
28 1905–1906 35th Ann. Rep. of M.O., L.G.B., App. A, 42.
29 1929 Canad. Pub. Health Jour., xx., 256.

UNITS OF SEX HORMONES

THE introduction of sex hormone therapy in the last few years has been attended by great confusion as to the terms in which dosage is to be expressed. This has complicated the task of the clinician in deciding, on the basis of experimental work reported in the voluminous literature, how much should be administered in order to produce a desired physiological effect. It is quite impossible accurately to compare amounts expressed in rat units, mouse units, or rabbit units in published investigations from different laboratories and clinics. These are values in local currency for which no rate of exchange can be quoted; only by adoption of units with international validity can sex hormone therapy be put on a scientific basis.

ANIMAL UNITS AND THEIR EVOLUTION

The origin of the present confusion can best be understood in relation to the development of the subject. When laboratory research leads to the recognition of a new biologically active material the first step is to put the observations on a quantitative basis by devising a unit of biological activity, so that some measure of the relative potency of different preparations can be obtained. As a matter of convenience, if not of necessity, this unit is in terms of a recognisable effect on a test animal. Naturally, each worker has his own ideas of a recognisable effect, of a suitable test animal, and of a convenient method of administration, to mention only the major factors involved. As a result there may be as many rat units, mouse units, or rabbit units as there are laboratories working on the subject, or even more. In favourable circumstances some kind of uniformity may be attained when a particular type of assay is adopted by the majority of workers, and—which seldom, if ever occurs—when they adopt a single method in all its minute details. In fact, a rat unit is not a unit at all outside the laboratory in which it is used, or even outside a single stock of rats over a limited period of time.

Unfortunately the physician is offered new hormone preparations at an early stage. He may receive copies of clinical reports of the effects of administering so many rat units of some particular preparation. This may be followed by another preparation of the same hormone, now biologically standardised in mouse units; or, it may be, rat units are again used, but the manufacturer has chosen another method of biological test which will show his preparation in a favourable light. The research worker may find himself appealed to and confronted by queries such as "I have been advised to give 300 rat units of preparation A. I find that I have preparation B available, but this is in ampoules containing 2000 mouse units. How much must I give?" The conceptions of what constitutes a unit are multitudinous. Occasionally the research worker himself produces such complexities as "rat units assayed by the rabbit method" or "rat units of comb-growth activity" which would require very involved explanations to the uninitiated. Again, the way in which ideas may be perverted is illustrated by a report of laboratory work in which it is stated that the excretion of male hormone in human male urine was estimated at 500–800 capon-comb units in three days when an extract of the urine was administered to capons by anointing the comb, whereas the quantity in the same extract, as determined previously by intramuscular injection, was 3–15 capon-comb units in three days. This is to conceive the unit, not as one of biological activity of a certain amount of male hormone substance, but as one of biological effect, in such a way that the number of units in a given amount of material would increase every time a more efficient mode of administration was discovered. A consistent and logical system can only be built on the fundamental conception of a unit of potential biological activity in a certain amount of material. The effectiveness of this unit—i.e., the extent to which this potential activity produces an effect—is a matter of efficiency of utilisation, controlled by factors such as the mode of administration. Biological assay must be based on the comparison of a standard substance with the material assayed under conditions in which the efficiency of utilisation is the same.

INTERNATIONAL UNITS

When it is possible to manufacture sex hormones on a commercial scale in a pure state, and pharmacopœial specifications can be laid down, they may be prescribed and administered by weight, or, as a matter of practical convenience, in solutions of specified concentration expressed in weight contained in a given volume. A number of such compounds are now becoming available in the œstrin and male hormone series. In the meantime, however, crude materials or composite extracts have to be standardised by biological assay. Biological assay is too often an act of faith in the continued uniformity of response of test animals under laboratory conditions, and even with the control provided by statistical science, this act of faith, unless it is accompanied by both observation of sufficient control animals and constant comparison with some standard material preparation, will degenerate into an act of superstition.

There are now available three standard sex hormone preparations for international use—namely, œstrone, œstradiol monobenzoate, and androsterone—and a fourth, progesterone, will probably be set up next year. In each case an "international unit" has been defined as the specific biological activity of a certain weight of the standard preparation. The weights of the international units are as follows: œstrone, 0·1 γ; œstradiol monobenzoate, 0·1 γ; androsterone, 0·1 mg.; progesterone, 1 mg. The standard preparations are crystalline materials of the highest degree of purity practically attainable. Their activities per unit weight may be expected to differ little from those of the ideally pure substances, but it is beside the point whether they are pure or not; as Prof. Laqueur has said, they are standards in the same sense that the distance between two points on a certain metal bar is a standard metre, although it is not the forty-thousandth part of the earth's quadrant it was set up to be. The only relation of the international units to "animal units" is that they are of the same order of magnitude, and any statement of the "ratio of animal units to international units" must be accepted with the utmost reserve and considered as applying only to the particular laboratory concerned. Even so, determination of such ratios is extremely useful as a key to the work of that laboratory, and it is regrettable that through habit and conservatism so many workers adhere to their own animal units.

It is impossible, for obvious reasons, to give a table of equivalents of animal units and international units. In the case of œstrone, for example, in the first place the ratio of the rat and mouse units varies

according to the method of administration, and ratios ranging from 1 : 1 to 9 : 1 have been recorded, whilst a rat unit has been estimated at anything from 3 to 25 international units, and in one laboratory alone the mouse unit varied from 0·44 to 0·77 I.U. within a period of six months. In the case of androsterone the relation of different capon units to the international unit may vary over a wide range, but if comparison is confined to intramuscular injection methods, the ratio varies only between 0·7 : 1 and 1·2 : 1. The methods of assay of progesterone have not suffered from the urge for elegant variation to the same extent as other hormone assays, and it can be said that, approximately, 1 mg. of progesterone in oil solution is equivalent to 1·3–1·5 Clauberg rabbit units or 0·5–0·75 Corner-Allen rabbit unit. There is also a German "clinical unit," a hardly necessary addition, which has been defined as 0·25 I.U. or 0·33 Clauberg unit.

The standardisation of gonadotropic hormones on such a system is unfortunately still impossible. At least three classes of gonadotropic hormone preparations are recognised, from anterior pituitary, from pregnant-mare serum, and from human pregnancy urine, and two types of activity are displayed—namely, follicle-stimulating and luteinising action—to which may be added a synergic factor in the pituitary. Rat, mouse, and rabbit units have all been employed. The ratio of rat unit to mouse unit has been given very different values; it has even been suggested that the three classes of preparations mentioned can be differentiated by the values of the rat : mouse ratios, which, under certain conditions, are 1 : 3, 2 : 1, and 5 : 1 for pituitary, serum, and urine, respectively. On the other hand, there is evidence that the ratio of follicle-stimulating to luteinising activity may vary widely in preparations of the same class. Until the chemist can sort out this tangle of factors into chemically characterisable and stable substances, the erection of final international standards is impossible. The best that can be hoped for is that sufficient agreement will soon be possible among the workers concerned for provisional standards of an arbitrary type to be set up.

In the meantime the only advice which can be given to the clinician is that he should choose an active preparation which can be relied upon for stability and uniformity and keep to the use of that one alone.

MEDICINE AND THE LAW

Prosecution for Alleged Conspiracy to Sterilise

MEDICAL students in this country are carefully taught that the patient's consent is essential before an operation. Otherwise a technical assault is committed and in law the operator is liable both to be prosecuted and to be sued for damages. Nice questions arise over implied consent and over the surgeon's natural desire to do the best he can in emergency. In any operation involving permanent disability, especially for instance a sterilising operation, particular care must be taken to explain what it is proposed to do; indeed the written consent of the patient is desirable and every possibility of misunderstanding must be avoided. The case of Cull *v.* Royal Surrey County Hospital in 1932 (THE LANCET, 1932, i., p. 1377) was typical of the action for damages which may ensue. Lest it be thought that litigation of this kind is entirely confined to civil claims for compensation, the New York correspondent of the *Times* has lately recorded a prosecution of two San Francisco doctors on the criminal charge. Miss Ann Hewitt alleged that they had entered into a conspiracy with her mother to sterilise her in order that the mother might gain control of her late husband's large fortune. The sterilising operation was said to have been performed under pretence of an operation for appendicitis. The criminal charges of conspiracy for mayhem (i.e., serious wounding, such as cutting off a limb, breaking a bone, or castration) were dismissed by the judge on the ground that Miss Hewitt had failed to establish her case against the accused. It is stated that a civil action, claiming 500,000 dollars as damages, is pending.

With criminal proceedings in respect of a sterilising operation the State may feel concerned as well as the aggrieved patient. Research in the mediæval law reports and treatises will show that an offence like suicide is reprehended because it deprives the King of a limb (however minute) of the body politic; it means the loss of a possible soldier or tax-payer. Sterilisation involves loss of potential citizens and the tendency of the law is to view it with disfavour. Something of this almost political dislike of interference with the natural functions of reproduction must have joined with social and religious elements to make criminal abortion a grave offence. But public policy changes. Attempted suicide is no longer a serious matter; the police frequently refrain from prosecution and their sole concern is the better environment of the patient. Abortion is still a grave offence, if only because of the appalling physical risks associated with furtive and unskilled treatment.

PARIS

(FROM OUR OWN CORRESPONDENT)

A SOCIOLOGICAL STUDY OF THE JUVENILE VAGRANT

MUCH valuable light is shed on the problem of the French vagrant boy by Dr. J. Roubinovitch and Mlle. B. Bugnion, whose findings are published in the *Bulletin de L'Académie de Médecine* (1936, xxvii., 77). The 41 boys between the ages of 13 and 17, arrested for vagabondage and brought before a juvenile court, were subjected to a searching medico-psychological examination, and an investigation of the conditions under which they had grown up. In as many as 30 cases the homes from which these boys came were morally and materially miserable. As for the influences of heredity, 12 of the parents were alcoholics and 5 were neuropaths; in as many as 24 cases one or other of the parents was alcoholic, neuropathic, tuberculous, or paralytic. The Binet-Simon-Terman intelligence tests showed an average considerably below normal (0·87). A third of all the cases had an intellectual quotient below 0·70, one-half a quotient between 0·70 and 0·99, and only a sixth a quotient of 100 to 122. The auditory memory was remarkably defective in these vagabond boys, being only 10 to 20 per cent. of normal. Their visual memory, on the other hand, was considerably better, the average being 55 per cent., and for a fifth of the total it was even 100 per cent. Other failings common to many of these boys was great slowness of the intellectual and motor reactions which, in conjunction with their faulty auditory memories, did much to lessen their chances of making good in life. The fate awaiting the average juvenile vagrant can

be foretold easily enough. A petty theft at home enables the boy to reach Paris where, within three weeks, all his resources are exhausted. He is then arrested by the police for loitering in some station or in the underground railway. Or he lets himself become a cat's-paw for illicit street salesmen who themselves evaporate into thin air when the police swoop down. Or for a few days a pittance is earned by night work as a porter in the Halles, the Parisian equivalent of Covent Garden Market. Or—and this was the case with as many as 11 of the 41 cases studied—the boy is netted for prostitution by some adult homosexual; the boy overtaken by such a fate is apt to remain a source of perversion for his companions in an institution or at work. The point which the authors of this study are most anxious to drive home is that the juvenile vagrant belongs to at least three different categories for each of which very different treatment is required. For the most mentally defective, incapable of learning a trade, the remedy is prolonged residence in some special institution. For the subnormal adolescents who are, however, capable of education, facilities for acquiring trades adapted to their capacities should be provided in special institutions. For the juvenile vagrants whose intelligence is normal or above normal, the remedy is healthy surroundings in which a suitable apprenticeship will give scope for their gifts. And whatever the category to which the juvenile vagrant belongs, it should always be remembered that vagrancy in itself is not a crime.

THE HEALTH OF THE MERCHANT SERVICE

In a survey of the health of the French merchant service, M. Marcel Moine, statistician to the Comité National de Défense contre la Tuberculose, has lately drawn attention to the striking local differences in the ravages of tuberculosis. The French littoral is mapped out into five administrative regions. Brittany is the blackest with regard to tuberculosis, and in one area there were 103 cases of this disease per 10,000 men, whereas in the Marseilles area the corresponding figure was only 11·9. Algiers comes still lower with 4·9. The two causes of invalidism and death which play most havoc in the merchant service are accidents and tuberculosis; tuberculosis comes first as far as the interruption of work is concerned, whereas the period of disability due to accidents is comparatively short. But in the matter of deaths and pensions awarded to widows and orphans, accidents in the form of drowning come first and tuberculosis second—a bad second seeing that in 1934 pulmonary tuberculosis was responsible for 21·5 per cent. of all the deaths. Accidents come first and tuberculosis second in qualifying members of the merchant service for invalid pensions.

DIPHTHERIA IMMUNISATION FOR MEDICAL STUDENTS

Dr. Robert Clément had a good reception on July 23rd at the Academy of Medicine when he supported his plea for the routine immunisation of medical students against diphtheria by disquieting data. At the Trousseau Hospital between 1923 and 1934 there were 88 cases of diphtheria among its medical students, and the experiences of several other Parisian hospitals are equally significant. For several years, on the indication of the Schick test, entrants to the Salpêtrière school of nursing have been artificially immunised against diphtheria, and it seems unfair to deny to medical students what is not merely offered to but actually imposed on nurses. Now that medical students in their first year are being tested with tuberculin and given a clinical examination for tuberculosis, might not, Dr. Clément suggested, this occasion be taken to test medical students with the Schick as well as with the Pirquet reaction, and to immunise with Ramon's anatoxin those found susceptible to diphtheria? It was urged that in the Schick test the reading of the intradermal reaction should be deferred till the fourth or fifth day, for by the fourth day the protein reaction has disappeared and the toxin reaction is at its maximum. Students as a class, to judge by numerous investigations, are Schick-positive more often than not, and it would, therefore, surely be necessary to give two or three subcutaneous injections of Ramon's anatoxin to more than 50 per cent. of the students tested. Dr. Rouvillois, speaking at this meeting of the Academy of Medicine, endorsed Dr. Clément's plan but would like to go one step further and immunise medical students at one fell swoop against typhoid fever, diphtheria, and tetanus. A bill for rendering such triple immunisation compulsory in the French army is, by the way, already submitted to the French Parliament.

DEATH OF M. ROBERT CHARLET

On July 12th, at Châteaudun, Robert Charlet and his son Michel were killed in a flying accident. Robert Charlet was secretary-general of the Amis de l'Aviation Sanitaire and a veritable pioneer in the promotion of air ambulances. He was also secretary-general of the Comité Permanent des Congrès Internationaux de l'Aviation Sanitaire and he was a well-known figure in the office of the League of Red Cross Societies in Paris, where he was tireless in helping representatives of the Red Cross from all parts of the world. He might, indeed, be described as the pivot about which international activities in this field revolved.

BUDAPEST

(FROM OUR OWN CORRESPONDENT)

A TYPHOID EPIDEMIC

DURING the typhoid epidemic that raged at Debreçen in 1935 it was remarkable that the peak of the epidemic was in September, considerably earlier than usual. The curve of incidence was level during October and November, the total number of cases being 276. Of the patients, 69 were agricultural, 52 industrial, 12 merchants, 36 civil servants and professional men, 74 labourers, 17 domestic servants, and 16 of various other occupations. Out of the 276 patients, 22 were concerned in their employment with foodstuffs, and of the carriers of the disease 19 dealt with the manufacture or the sale of food. The houses of the carriers were found to be foci of infection in several instances during the epidemic. According to the investigations made by the medical officers of health of the city and also by the bacteriologist of the medical faculty of the University of Debreçen, the epidemic was caused by the recognisable and unrecognisable contact of the carriers with others, and by the mediation of milk and other foods. The sources of infection were unknown in 184 cases, contact in 72, carrier infection in 10, and milk-borne in 10. The chief city medical officer states that flies, house refuse, and vegetables from the Bulgarian gardeners, who in the forced cultivation of the plants water them with swamp water, had certainly contributed to the spread of

the epidemic. The great number of children among the patients was striking, for 38·8 per cent. of all patients were under the age of 15. Debreçen is poor in drinking water, there being no river either in the town or the neighbourhood. In the suburbs of the town 56 per cent. of the wells, serving drinking water, contained *Bacillus coli*. In some parts, where typhoid occurred in great masses, there were scarcely any wells supplying wholesome drinking water; in other parts, in spite of bad well conditions, there was no infection. The mortality amounted to 11·2 per cent.

CONGRESS FOR THE CARE OF THE CRIPPLED

The third World Congress for the Care of the Crippled, which was held here from June 29th to July 4th, was attended by delegates from many nations. Besides lectures and demonstrations on the clinical aspects of deformity, the congress discussed the responsibility of the State in prevention and in the training and after-care of its cripples. Several delegates described and commented upon the pertinent laws and affairs in their own countries.

GRAINS AND SCRUPLES

Under this heading appear week by week the unfettered thoughts of doctors in various occupations. Each contributor is responsible for the section for a month; his name can be seen later in the half-yearly index.

FROM A DOCTOR WITHOUT PATIENTS

Son: Father, I should like to be a doctor; what does one do?

Father (F.R.S. and teacher of "intermediate" subjects): Well, my boy, I entered the St. Christopher's Hospital Medical School and——

Son: Oh, I don't mean like *you*, Father, I want to be a *real* doctor with patients.

* * *

We doctors without patients who straggle back into Bloomsbury during September find a new scene. The new university building is occupied; it is no longer an empty shell; one can enjoy the light of the principal's countenance without a depressing 25 minutes' journey in the bowels of the earth. Anyone who has known the Gower-street area since the beginning of the century has seen great changes. First there was the new University College Medical School and Hospital, then the bilateral expansion of University College. The new medical buildings suddenly changed the landscape, but the growth of University College has been too regular for a passer-by to heed. The last ten years, bringing the London School of Hygiene and Tropical Medicine and the university buildings, have made a more spectacular difference than the previous twenty-five. Bloomsbury is beginning to look academic—with a difference. It is still possible for a Cambridge undergraduate (hardly for an Oxford undergraduate, thanks to Lord Nuffield) to think town exists for gown. Nobody in Gower-street or in Glasgow could make that mistake. The fundamental truth that university teachers and students are a very small item of humanity is impressed upon the Glasgow student more artistically. His university is set upon a hill in homogeneous surroundings. But no professor or student looking down upon the great city *could* think himself very important.

One cannot look down upon London from the new buildings, but one can walk into Southampton-row, past the ugliest hotels even in London, and lose instantly any academic flavour while gaining a faint flavour of fried fish and a powerful odour of petrol. Still, if the drivers of lorries are sufficiently terrorised by the vice-chancellor, there will be some peace in the university quarter. Senior teachers will have been pensioned off (or be dead) before the Great Hall could echo to their rather self-conscious footsteps, but this is not to suggest that the great constructive work tarries, for there is much to be done.

Some cities are used to academic processions, Dublin, Edinburgh, Cambridge, and perhaps pre-eminently Oxford; Bloomsbury is not. In the ancient seats of learning academic robes have not always been fancy dress. Fancy dress is *so* trying unless one wears it every day, and if the vice-chancellor were to issue an instruction that all appointed teachers must always wear academic robes when entering the new building, I am afraid the police would interfere before we had got used to robes. Some years ago I took part in a procession from the Imperial Institute to the Albert Hall. The straggling and self-conscious galaxy of spectral colours, preceded by an inspector of police, encountered a "crocodile." The segment of it opposite me, a cheerful maiden, stared and in genuine surprise asked, "What *on earth* are you doing?" I have often wondered what the right answer was. Still, even without the Great Hall now rising, one has an imposing academical body. Will it be informed by spirit? As a small boy I used to try to combat the tedium of the sermon by reading the less familiar parts of the Book of Common Prayer. "The Form and Manner of Ordering of Priests" and, still more, "The Form of Ordaining or Consecrating of an Archbishop or Bishop" thrilled me. I imagine that the singing of *Veni Creator Spiritus* by a cathedral choir is impressive. I suppose it would be too "sectarian" a chant to be rendered in the new building by the Royal Academy of Music, just to remind us that the giving or withholding of the spirit will determine whether the home of a university or a new suite of palatial offices has been added to Bloomsbury. I wonder whether the medical faculty of the university will foster spiritual growth. That faculty has indeed provided more than its numerical quota of vice-chancellors and representatives in Parliament. But do the medical teachers care for the university as a whole?

* * *

This holiday month is the time when one returns gratefully to the writings of a leisured age, to such books as "The Diary of a Country Parson," and amuses oneself by comparing the Rev. James Woodforde's September programme with one's own. In spite of the insistence of our faculty upon the importance of first-class protein, few of us will have eaten our way through the first week of September, 1936, so gallantly as the Rev. James went through the first week of September, 1783. On Sept. 2nd he and the Bodhams dined on a leg of mutton boiled, a couple of ducks roasted and apple tarts. On Sept. 4th he was one of 20 entertained by the Bishop, "and a very elegant Dinner the Bishop gave us." There were two dishes of "prodigious fine stewed Carp and Tench, and a fine Haunch of Venison," and for a second course, there were fine Turkey Poult, Partridges, Pidgeons, and Sweatmeats. On Sept. 5th

the Micklethwaites gave him for dinner, "hashed Calf's Head, a Goose roasted, A Turky, Partridges, Mushrooms, baked Apple Pudding and Lemon Cream. Desert, a Pine Apple, Peaches, Nectarines and Pears." It seems possible that the Rector of Weston consumed too much first-class protein. Dr. Thorne was of that opinion, for in October, 1794, he "would not have me eat any salt Meat nor drink any Wine and but little Malt Liquor. I might eat Mutton, Veal or Chicken and Puddings." That day there was boiled neck of mutton and a roast goose at the rectory, but "I eat no Goose." Next day there is this melancholy comment on the doctor's prescription. "Living too low wont at all agree with my gouty Constitution and past fifty-four Years of Age." We are in the habit of attributing the short lives of those of our ancestors who could afford to live well, to excess of drink rather than of food, because we recall Charles James Fox and William Pitt the younger, but diaries like that of Woodforde point to excess of animal protein rather than of wine as habitual. The Rector's medical attendant—whom he sometimes calls "Dr." and sometimes "Mr." Thorne—had a troublesome patient. Two days before the Bishop's dinner party in September, 1783, nearly everybody at the rectory was "ill in the present Disorder and which is called Whirligigousticon by the faculty." Sir William Hamer, I am sure, would have marked it down as a "trailer" of the influenza of 1782. It visited the Rectory again in March, 1784, and Dr., or Mr., Thorne (after all, we should reserve the prefix "Dr." for a more famous medical Thorne who is immortal although he never existed) treated it as malaria and drastically. This was his prescription :—

"To take a Vomit in the Evening not to drink more than 3 half Pints of Warm Water after it as it operates. The Morn' following a Rhubard Draught —and then as soon as the Fever has left the Patient about an Hour or more, begin with the Bark taking it every two Hours till you have taken 12 Papers which contains one Ounce. The next oz., etc., you take it 6 Powders the ensuing Day, 5 Powders the Day after, 4 Ditto the day after, then 3 Powders the Day after that till the 3rd oz. is all taken, then 2 Powders the Day till the 4th oz. is all taken and then leave of."

Miss Nancy (the Rector's niece) "continued brave" on this treatment but "seemed Light in her head," which is perhaps not surprising.

* * *

The Rev. James Woodforde was not much interested in books and has very little to tell us about the spectacular events of his time, but anybody who has browsed among the five volumes edited by Mr. Beresford will quote Austin Dobson :—

> "Lie softly, Leisure! Doubtless you
> With too serene a conscience drew
> Your easy breath, and slumbered through
> The gravest issue;
> But we, to whom our age allows
> Scarce space to wipe our weary brows,
> Look down upon your narrow house,
> Old friend, and miss you!"

* * *

They are pretty lines, but with a touch of preciosity. There is a good deal of cant in the talk about the "cool sequester'd vale" of life in other ages and the "noiseless tenor" of other men's ways. Dr. Thorne (of Weston), as the diary proves, certainly did not find time hang on his hands any more than the contemporary in the west who in July gave us in this column so charming a sketch of his daily work. He has found that life is just one damned thing after another; so do all of us, in the eighteenth or the twentieth centuries, country practitioners or university professors. One responsibility of a country practitioner a medical professor (non-clinical) does elude. No individual human life depends upon his readiness of hand and power of swift decision. Committees of "experts"—a detestable word, so rightly suggestive of *expers*, which means ignorant—may indeed give decisions which wreck (or save) many human lives, but the responsibility is not individual. With that exception, life is just as clearly one damned thing after another for a professor as for a country doctor. The notion that professors (at least in medical schools) divide their lives between pure research and high-browed teaching is—notional. Whether my uninterrupted flow of thought would really bring down much gold from the hills is a question upon which I have an opinion (not for publication). I (like my colleagues) suffer it to be interrupted by all sorts and conditions of men. The "expert" in a borderline subject like mine has as varied a collection of visitors as a lawyer.

There are the doctors and the administrators who wish me to "prove" (or "disprove") something "mathematically." There are the pure-blooded researchers who think that I can suggest some practical application of their mysterious discoveries. There are young men and women who wish to take up Research—with a capital R—and hope I can tell them how to do it. There are hordes of folk who say, and perhaps think, they only wish me to "glance" at piles of script, but *really* hope that I (or a colleague) will spend laborious days verifying and correcting their results and then finding a publisher for them. In the last three years I have had more tragic visitors. It is said to be easy to forget the misfortunes of others. I have not found it easy to forget interviews with colleagues who had been honoured names to me and materialised as penniless suppliants for the hospitality of a foreign country. I cannot forget the strain of expressing in a foreign language to young men and women who had seemed to be at the gate of what, they thought, was paradise, my belief that the gate was irrevocably shut. There is nothing more futile than for a middle-aged man without political experience or knowledge to rage against the doings of foreign or even native politicians. But when I read in the papers that a foreign government is thinking of offering to young Englishmen scholarships similar to the Rhodes scholarships, I *am* reminded of a passage in Macaulay. The High Commission had expelled the Fellows of Magdalen. "The Vice-Chancellor had been asked to dine with the Commissioners on the day of the expulsion. He refused. 'My taste,' he said, 'differs from that of Colonel Kirke. I cannot eat my meals with appetite under a gallows.'"

ROYAL GWENT HOSPITAL.—In view of the services of the Royal Gwent Hospital to a special area, the Commissioner for the Special Areas has agreed to make a grant of £10,000 towards the proposed extensions and alterations. The work will cost £34,300, and the Commissioner's gift is on condition that the balance of £24,300 is in hand. Last year an appeal for £100,000 was launched, about two-thirds of this sum being required to clear off the overdraft, and about £40,000 has been subscribed. Until the overdraft is cleared off the grant cannot be claimed, and this means raising another £50,000.

CORRESPONDENCE

APPOINTMENTS IN CLINICAL SCIENCE

To the Editor of THE LANCET

SIR,—Under this heading in your issue of August 15th a correspondent makes some comments on the post-graduate studentships and research fellowships which are now being offered by the Medical Research Council to encourage young British medical graduates of special ability and original mind towards becoming investigators in clinical science or experimental pathology. The suggestion is made, in particular, that the funds available for this purpose might have been more usefully employed in establishing a few whole-time posts for workers of already proved capacity.

In this regard it may be useful to point out that the new scheme of studentships and fellowships is supplementary to an existing policy of creating just such posts as your correspondent appears to have in mind. The Medical Research Council have in recent years frequently made public their intention to make further permanent appointments for whole-time research in clinical science. They have also encouraged the establishment of whole-time positions in clinical subjects within the universities and medical schools. In this way they have hoped to increase the opportunities for men seeking careers in clinical science, such as the academic system of this country already makes possible in other branches of medicine.

The Council, further, have already acted on their policy by establishing posts of this kind, including two of what may be regarded as professorial rank. There have also been parallel developments in other quarters. The Council are anxious to increase the number of these appointments, and any delay in doing so is not due to shortage of funds but to the scarcity of men having the requisite qualifications.

The fundamental difficulty in recruiting for whole-time research must not be ignored, but it is to be found in rather a different direction from that suggested by your correspondent. It lies in the fact that something more than ability, training, and the desire to investigate is needed to qualify a man for permanent employment in this type of work; and that the possession of special capacity for research is not easily or quickly discoverable either by the man himself or by those who may wish to help him.

I am Sir, yours faithfully,

E. MELLANBY,
Secretary to the Medical Research Council.

August 26th, 1936.

MEDICINE AND PEACE

To the Editor of THE LANCET

SIR,—As citizens, many medical men will find themselves in favour of the four points of the International Peace Campaign. It seems to me, however, that the contribution of "the medical profession" to peace involves something more searching than adhesion to this programme. Perhaps more than most people we have the opportunity to discern the motives which cause human beings to act stupidly, cruelly, hysterically, beside themselves; we see the results of fear in them, and the determination with which they will deceive themselves rather than face the truth; and we know ourselves only too well that causes have their effects, that there are times when little or nothing can be done, that it is futile for us or our patient to expect a miracle, and that there are occasions when the only thing left is courage to face a hard situation and save from the wreckage what can be saved.

Nobody can want modern war, except sadists or perverted individuals; yet once more "the lights in Europe are going out," and quickly. In face of the deeper realities, these four points lack a sense of our tragedy, and many must feel as I do that the actualities of our modern world have gone beyond them. Take the third point, that of "collective security"; in our present world of sovereign states it means alliances, and if need be, war once more to end war.

The supporters of "collective security" remind me of the gin-drinker's friends. His own wise doctor had told him not to touch it, for he had had several disturbing attacks before. Finally he developed a hob-nail liver, and though the doctor did what he could, the man had to dree his weird, for there was no miracle by which he could exchange his liver for a new one. "What a hopeless, pessimistic doctor," said these friends, "the one thing that will save you and yours from disaster is medicinal gin—but it must be *medicinal* gin." Unfortunately the man died anyway, but the friends always maintained that if only he'd been given medicinal gin early enough, he would have been all right.

Cannot we build our Medical Peace Campaign on a deeper and firmer foundation? Have we not a special duty, based on our work and knowledge, to rise above our individual "-isms," and help our distressed and confused fellows to see clearly some aspects at least of the truth and press them to face it? Then their decision, whatever it be, will be based on realities.

It is, I believe, a true diagnosis that the terrible danger of our modern times lies in the fact that in many countries there is a mass-neurosis in which conduct and action are founded not on the fundamental emotions and realities of man's life, but on perversions and illusions. Mankind has been hard pressed—by the carrying on into the "peace" of a war which has never really stopped, by economic difficulties which have destroyed much hope, by widespread despair; "things" are out of control, men feel—a significant illustration of how far the recognition of the value of individual personality and of human life has fallen. There is disillusion, and a lack of that grand human heroism which refuses to be dominated by "things"; and a measure of what such a heroism would mean is given by the technical development of modern war. For war has become something almost satanic, a thing of factories and laboratories and applied science, against which human flesh and blood are helpless. The same sort of domination of man by the machinery he has created is seen in the economic life of "peace." Must we be content merely to be slaves of machines? Or can we regain control of them and of our prostituted science?

Of course we can, if we can dare to see clearly, if we have courage to face the truth and enough heroism to be men and not merely tools. But one of the most terrible features of modern life is that men everywhere are in despair, have not the grip or courage to mould their fate as supremely valuable personalities, huddle together like the Gadarene swine, willing to follow any likely leader who helps them to feel "together," hoping that he will lead them "to the haven where they would be." They

are willing to be passive slaves to abstractions like "race" or "the State"; and then their minds and hearts are open to all sorts of romantic rationalisations about the glory of war and the devilry incarnate of other groups of their fellow men. And because the willingness to murder, by becoming slaves to the modern war-technique, involves the denial of human value, and an exaltation of the machine which will not only kill others but also themselves, there comes a terror and hopelessness into modern existence. The young especially feel that they are living under the shadow of death, and it is thence but a short step to what Berdyaev has called "a romanticism of death." The will to kill becomes one with a desire for self-immolation—a pathological, twisted urge to express some sort of reckless courage. *Morituri*, they will at any rate lead the way, even though it is the way to chaos and destruction. This seems particularly true of German youth; indeed, I remember so acute and experienced an observer as Harold Nicolson saying, years ago, that there is an almost suicidal streak in the German character which under pressure might lead them to plunge into the abyss.

It is because I feel this to be a true analysis of our modern tragedy, that I think the four points inadequate. It is like asking the hysteric to be reasonable, and I do not feel that it is the job of the medical profession to join the layman in such a request. The problem goes deeper, into the dark places of the human mind and spirit; the way in which we can help, is by an analysis of men's emotions and motives, by the patient insistence that only as men meet their *real* problems with sincerity and courage will they find peace in themselves and their world, and finally by the advice we can give on the best way of dealing with human beings who are in danger of doing something catastrophic to themselves and their fellows by reason of their anxiety and tension.

We in England have a particular responsibility now, for we have not been so hard pressed as many of our fellows in other countries. We can meet the situation in one of two ways. Accepting the danger, we can meet it by building up our armaments as we did before 1914; but let us be clear that men ridden by fears and despair will "be frightened to attack" only as long as the tension holds. One day it will snap, and we shall reluctantly add our scientific weapons to all the rest that will destroy civilisation. Or we can take up our responsibility as trustees of the reality of the infinite worth of human personality, and fearlessly and disinterestedly undertake the task of discovering, bringing out into the open and helping to release the anxieties and tensions which threaten to engulf our world. But we cannot have our cake and eat it; as a therapist, you cannot even begin to help the patient with an anxiety neurosis if he knows that you are afraid of him and have got a machine gun trained on him in case he runs amok.

The politicians, and even the ecclesiastics seem helpless to grasp and control the situation. We in the profession have knowledge of men and of their minds, and we can tackle in quietness, even if not always in confidence, seemingly lost causes. We might do a great thing for the world if a small international gathering of medical colleagues would make a start by coming together, to face in frank and friendly collaboration this dangerous and widespread problem of men's anxieties, their root causes, their abnormal manifestations and the way to deal with them. For they will have to be dealt with—even after a terrible war and the breakdown of civilisation.

There is one further way in which we can help our fellows—namely, in driving home the fact that if men sow the wind, they must reap the whirlwind.

I am, Sir, yours faithfully,

Liverpool, August 24th. ROBERT COOPE.

FIXED DENTAL APPLIANCES

To the Editor of THE LANCET

SIR,—I think a little might be done to remove a misunderstanding which appears to exist regarding the merits or otherwise of fixed dental appliances. The principal objections made to this kind of work are:—

(1) It cannot be removed from the mouth, and, therefore, it must be unhygienic.

(2) By reason of the above and the fact that parts of the appliance impinge upon the soft tissues, irritation must be caused to the gums and infection occurs.

(3) Loss of the vitality of the supporting teeth is either deliberately or accidentally brought about by the use of this work.

(4) Too great stress upon the supporting teeth is liable to produce a condition of trauma and infection.

(5) The supporting teeth are always in an infected condition.

In justice to these objections it must be admitted that, in many cases, they have been only too well founded, but the point of these remarks is that, provided the work is carried out expertly, there is no need for any of these troubles to occur.

The first charge on the list is chiefly one personal to the patient, and, if there are signs of want of care of the mouth, a little instruction should put matters right. Their own natural teeth, whether used to support work or not, will suffer if neglected. Well-constructed work will, however, give little chance for the lodgment of food debris that cannot be removed in the ordinary way. The second objection—that the work causes inflammation in the soft tissues—is one that can only be brought against that which is poorly designed or constructed. In the majority of cases, where such work is indicated at all, the fitted parts need not invade the gingivæ. Where this is unavoidable, the closeness of fit and the material employed will obviate ill-effects. If this result cannot be achieved, the case is not a suitable one for fixed work. Thirdly, the vitality of the teeth employed to support the work need not be interfered with deliberately even to produce a natural appearance. Restorations can be made, in suitable cases, in the most exposed parts of the mouth in a way which will overcome the loss of a tooth or teeth with excellent æsthetic effect; no devitalisation of the pulp is needed. Modern methods make this unnecessary. If a tooth is found to be already in a devitalised state, the question of its retention or extraction must be decided upon the merits of that particular case. A tooth does not have to be "dead" to support such work, nor does the fact that it is supporting it bring about the death of the pulp. Teeth which have been extensively filled sometimes give trouble in this way, but well-fitted fixed work will not cause such a catastrophe. It must be borne in mind, however, that all mouths should have periodical examination and this applies to those in which fixed work is placed. Neglect of this has done much harm and brought unmerited blame upon the appliance. Undue stress can be avoided by balancing the power of mastication for the patient, so that both sides of the mouth are capable of an equal amount of work; and all work of this kind needs careful adjustment to biting strains.

The last complaint I have left until the end because it seems to me the most serious and because it is unfair. It is serious because, if true, no work of this kind should be employed and those constructing it, knowing the results of its use, would be very much to blame; unfair because it is based upon the results of unskilled or hasty observation. If the wearer of fixed work, however well conceived, neglects it and his mouth generally and does not permit an expert examination to be made of it for several years, he will be lucky if something does not go wrong. It is not fair to condemn the work in such a case. Nor is it fair to cast obloquy upon the efforts of those sincerely endeavouring to do the right thing, by classing their work with that which has been badly constructed or fixed upon unsuitable foundations.

I hope that the foregoing will be of some service in putting this matter into the right perspective, as I am continually hearing of words of condemnation of this work by those who apparently take little trouble to ascertain whether every instance justifies the stigma which they cast upon it. There are many cases where a patient may be well served with a fixed appliance and it is often demanded. It is somewhat disconcerting afterwards for the wearer and the one who has constructed it to find that it is condemned on sight. I am, Sir, yours faithfully,

J. H. OLVER.

Park-crescent, Portland-place, W.

"MANNERS MUST ADORN KNOWLEDGE . . ."

To the Editor of THE LANCET

SIR,—I received to-day a circular from the British Empire Cancer Campaign asking me if I would be willing to give a lecture on cancer to the lay public. Skeleton notes for the lecture were provided. Amongst these in large type the following sentence occurred: "A cancer cell is a cell that has gone 'bolshie' and refuses to obey the laws of the community" There is a second reference to bolshevism as descriptive of cancer of the breast.

I am fully in agreement with the B.E.C.C. about the need for such lectures, but it seems desirable that the lecturers should have a more accurate knowledge of biology and politics than these notes indicate, and should refrain from insulting remarks to doctors and scientists in the U.S.S.R. whose aims and ambitions in this respect are the same as ours.

I am, Sir, yours faithfully,

R. PASSMORE.

Department of Pathology, University of Cambridge, August 21st.

WHEAT-GERM OIL

To the Editor of THE LANCET

SIR,—In your issue of August 22nd you print a letter from the chief chemist of Glaxo Laboratories Ltd. on the subject of wheat-germ oil, pointing out that the product marketed by his firm consists not of the oil but of a concentrate obtained by saponifying the oil. It is only fair to ourselves as another supplier of wheat-germ oil to point out that any vitamin preparation, whether a concentrate or not, should be supplied with a guarantee of activity, since if the original wheat-germ oil is inactive, no amount of concentration would produce a valuable product. Wheat Germ Oil Crookes' is guaranteed to contain vitamin E to the extent of 40 units on the Pacini-Linn scale.—I am, Sir, yours faithfully,

R. T. M. HAINES,
Chief Chemist, Crookes Laboratories.

Park Royal, London, August 29th.

THE LONDON CLINIC

To the Editor of THE LANCET

SIR,—In view of the recent reports in the press of the winding up of the company known as the London Clinic and Nursing Home Ltd., I would like to make it perfectly clear—

1. That the London Clinic was purchased in January last by the present company.

2. That the present company has no connexion with the old company now in liquidation.

3. That the present company is one limited by guarantee and under its constitution is precluded from distributing among its members any part of its profits, the whole of which must be applied to the promotion of its objects.

At present large sums of money are being spent on improvements in order to give to the medical profession and their nursing-home patients the best possible service. I hope that it will be clear to your readers, therefore, that there is no question but that the services of the clinic will continue to be available to them.—I am, Sir, yours faithfully,

(For and on behalf of
Trustees of the London Clinic Ltd.),
N. W. LEWIS, Secretary.

Sept. 1st.

A VIGOROUS VETERAN

To the Editor of THE LANCET

SIR,—I am all but 81 years of age and about two weeks ago drove my motor-car (a 6-cylinder Hudson Essex) 253 miles from here to Sherborne, Dorset, and back again in 10½ hours. I was quite fit at the end of the journey and could easily have done another 50 miles. I was neither stiff nor sore either then or next day. I am told this deserves a medical record. About five years ago I drove the same style of car some 242 miles in 8½ hours, stopping for nothing but petrol. My daughter was dangerously ill so I "speeded." The journey of this year I took quite quietly, ate egg sandwiches and drank tea every three hours or so. I motor-cycled from here to London and back, some 104 miles, when I was 76. I keep my body fit by punching the ball and riding a home trainer, and try too not to let my brain degenerate.

I see you have announced the death of William Cant; he must have been some years over 90 when he died. He took the fellowship of the Royal College of Surgeons of England in 1874. I was assistant demonstrator of anatomy at St. George's Hospital when he was polishing up his anatomy for the final examinations, and so came across him, and can appreciate why at the hospital everyone had a high opinion of him—indeed it was commonly said that he might have been on the staff of the hospital had he so wished. He was not only pleasant and popular but very able, and I feel that one who has done honour to the school of St. George's has gone from us.

I am, Sir, yours faithfully,

Hove, Sussex, August 31st. G. R. TURNER.

ALL-ELECTRIC HOSPITALS AT GLASGOW.—Hawkhead Mental Hospital is to be the first all-electric hospital under the control of Glasgow corporation. All the heating, cooking, and lighting will be done by electricity and there will be accommodation for 80 patients with quarters for a staff of 110 nurses. A new infectious hospital on the same lines is shortly to be started at Cowglen, and plans are already in preparation. It is to cost £300,000 and have 300 beds.

PUBLIC HEALTH

Enteric Fever Outbreak in the Bournemouth Area

On August 21st practitioners in Poole and Bournemouth reported to their health authorities a number of cases with symptoms of enteric fever and within a day or two it was clear that a focus of infection was giving rise to an outbreak over a wide area. Up to Sept. 1st 174 cases have been notified in Bournemouth, 122 in Poole, and 19 in Christchurch. The character and distribution of the outbreak led at once to the suspicion of an infected milk-supply, and with the collaboration of Dr. Vernon Shaw of the Ministry of Health it was soon established that the infection arose from milk which had not been pasteurised. All the known cases have in fact consumed milk from a dairy which has customers not only in Bournemouth but also in Poole and to a slight extent in Christchurch. Since August 22nd milk from the source in question has been efficiently pasteurised, but as the incubation period of the disease appears to be about fourteen days further cases are likely to be notified during the next few days. Both clinically and bacteriologically the epidemic is, we understand, one of typhoid. Isolation accommodation has been strained by the suddenness of the outbreak and extra hospital accommodation for the Bournemouth cases has been obtained by taking over a large house in the north of the borough known as Haddon Hill. Naturally all kinds of rumours have been current about the origin and extent of the outbreak and Dr. W. Asten, chairman of the Bournemouth public health committee, thought it necessary to give an assurance on Monday that there was no possible reason to connect sea-bathing with the outbreak. "Bathe by all means," he quoted the Ministry of Health's expert as having said.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED AUGUST 22ND, 1936

Notifications.—The following cases of infectious disease were notified during the week: Small-pox, 0; scarlet fever, 1351; diphtheria, 885; enteric fever, 88; pneumonia (primary or influenzal), 423; puerperal fever, 42; puerperal pyrexia, 124; cerebro-spinal fever, 11; acute poliomyelitis, 16; encephalitis lethargica, 4; dysentery, 10; ophthalmia neonatorum, 80. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on August 28th was 2755, which included: Scarlet fever, 788; diphtheria, 774; measles, 221; whooping-cough, 439; puerperal fever, 12 mothers (plus 7 babies); encephalitis lethargica, 284; poliomyelitis, 1. At St. Margaret's Hospital there were 17 babies (plus 6 mothers) with ophthalmia neonatorum.

Deaths.—In 122 great towns, including London, there were no deaths from small-pox, 2 (0) from enteric fever, 5 (2) from measles, 3 (1) from scarlet fever, 14 (2) from whooping-cough, 21 (2) from diphtheria, 43 (12) from diarrhœa and enteritis under two years, and 18 (4) from influenza. The figures in parentheses are those for London itself.

The deaths from enteric fever were reported from Sunderland and Birmingham. Of the deaths from diarrhœa and enteritis 4 were in Newcastle-upon-Tyne, 2 each in Bradford, Hull, Manchester, and West Bromwich.

The number of stillbirths notified during the week was 248 (corresponding to a rate of 36 per 1000 total births), including 44 in London.

OBITUARY

HENRY HARDACRE IRVING HITCHON, L.R.C.P. Lond., M.R.C.S. Eng.

Dr. Henry Hitchon was born at Langham, Essex, the son of the late Rev. George Hitchon, and was educated at Bishop Stortford Grammar School and the University of Manchester. His long connexion with Heywood was due to the appointment of his father as minister to the Baptist Church in that town, and for a time Henry Hitchon worked in the borough surveyor's department of the Heywood Corporation. He relinquished his post to take up medical studies at Owen's College, and qualified in 1889 with the English double qualifications. He went into practice immediately in Heywood, first in partnership and latterly alone. He soon secured an extensive practice and his professional position was recognised by his colleagues by the fact that he was at different times president of the Rochdale Medical Society and the Bury Medical Society. He was also, in part-time capacity, medical officer of health and school medical officer to the borough, holding the two posts until the appointment of a full-time officer. Other public organisations to which he gave support in the neighbourhood were the Heywood ambulance service, the Sick Nursing Association, and the Medical Charities Committee, while he was for a time medical officer of the Simpson Hall Maternity Home. He led a full life, meeting private and public responsibilities with equal efficiency.

Hitchon was known to all Lancashire for his devotion to cricket. He had played ever since he was a boy, and when the Lancashire League Committee came into existence, he represented the Heywood club on the committee. Later he was appointed on the Lancashire County Committee as a representative of the Lancashire League, and his devotion to the sport met its reward in his election to the presidency of the Lancashire County Cricket Club.

JOHN WILSON MOIR JAMIESON, M.B. St. And.

The death occurred in the King Edward VII. Hospital on August 7th of Dr. John Jamieson, a well-known medical practitioner in Slough. Dr. Jamieson was born in St. Andrews and graduated at the university as M.B., Ch.B. in 1904. He held various resident appointments in Dundee and was for a time demonstrator of anatomy at St. Andrews. He commenced practice at Slingsby, but later removed to Blackburn, where he practised for 15 years and where he took a practical interest in municipal affairs, sitting for a long period on the Blackburn town council. In 1924 he transferred to Slough and was a capable and popular practitioner in this growing town, making many personal friends among his patients and on the neighbouring golf-course. Dr. Jamieson, whose death followed operation, was only 57 years of age.

Manchester Royal Infirmary.—The post-graduate lectures and demonstrations given by the honorary staff of the Manchester Royal Infirmary will be resumed this year on Tuesday, Sept. 15th, and will be held each week on Tuesdays and Fridays at 4.15 P.M. till Dec. 18th. On Nov. 27th Mr. Julian Huxley, secretary of the Zoological Society of London, will deliver the Lloyd Roberts lecture and will speak on the uniqueness of man.

MEDICAL NEWS

University of Cambridge

Elmore research studentships have been awarded to Dr. A. C. E. Cole, Dr. G. D. Hadley, Dr. L. C. Martin, and Dr. Brian McArdle. They are tenable at Addenbrooke's Hospital, normally for two years, and form part of the developments in the Cambridge medical school described in our issue of June 27th (p. 1482).

Society of Apothecaries of London

At recent examinations the following candidates were successful:—

Surgery.—A. G. T. Brown, Guy's Hosp.; F. C. E. Diamond, Univ. of Durh.; C. R. Hardman, Univ. of Manch.; B. M. Jensen, Univ. of Liverp.; T. A. M. Johns, Univ. of Oxf. and King's Coll. Hosp.; J. H. Lewis, Univ. of Oxf. and Charing Cross Hosp.; C. W. Mills, St. Bart.'s Hosp.; I. A. Sarot, Univ. of Columbia; J. W. Spies, Univ. of Harvard; and P. A. Walshaw, Univ. of Leeds and London Hosp.

Medicine.—A. G. T. Brown, Guy's Hosp.; E. S. Dismorr, Univ. of Camb. and St. George's Hosp.; F. T. Futers, King's Coll. Hosp.; T. A. M. Johns, Univ. of Oxf. and King's Coll. Hosp.; J. H. Lewis, Univ. of Oxf. and Charing Cross Hosp.; C. J. Robarts, Westminster Hosp.; O. H. Saldanha, Univ. of Bombay; I. A. Sarot, Univ. of Columbia; and W. G. Zorab, Guy's Hosp.

Forensic Medicine.—A. G. T. Brown, Guy's Hosp.; E. S. Dismorr, Univ. of Camb. and St. George's Hosp.; F. T. Futers, King's Coll. Hosp.; T. A. M. Johns, Univ. of Oxf. and King's Coll. Hosp.; D. L. Jones, Univ. of Liverp.; J. H. Lewis, Univ. of Oxf. and Charing Cross Hosp.; C. J. Robarts, Westminster Hosp.; O. H. Saldanha, Univ. of Bombay; I. A. Sarot, Univ. of Columbia; S. Zisserman, Charing Cross Hosp.; and W. G. Zorab, Guy's Hosp.

Midwifery.—A. G. T. Brown, Guy's Hosp.; E. S. Dismorr, Univ. of Camb. and St. George's Hosp.; G. M. Edwards, St. Mary's Hosp.; C. R. Hardman, Univ. of Manch.; S. M. M. Niall, Royal Colleges, Edinburgh; B. A. R. Pitt, Guy's Hosp.; J. H. Roberts, Univ. of Camb. and Charing Cross Hosp.; and I. A. Sarot, Univ. of Columbia.

The following candidates, having completed the final examination, are granted the diploma of the society entitling them to practise medicine, surgery, and midwifery: A. G. T. Brown, B. M. Jensen, C. W. Mills, O. H. Saldanha, I. A. Sarot, and C. J. Robarts.

British Red Cross Society

A course of seven lectures on air raid precautions and first aid in chemical warfare are to be given on Fridays, at 5 P.M., by Major H. N. Stafford. They will begin on Oct. 2nd at the house of this society, 9, Chesham-street, London, S.W.

St. George's Hospital

Sir Crisp English will present the prizes and deliver the inaugural address, under the title of Looking Forward, at 3 P.M., on Thursday, Oct. 1st, in the board room of the hospital. The annual dinner will be held at Claridge's Hotel on the same day, at 7.30 for 8 P.M. Dr. Harold Spitta, M.V.O., hon. bacteriologist to the hospital, will be in the chair.

Post-graduate Courses in Berlin

The following are the subjects of international medical post-graduate courses to be held in Berlin in the autumn: diseases of the ear, nose, and throat, Sept. 28th to Oct. 10th; pædiatrics, Oct. 19th to 24th; cancer, Oct. 19th to 26th; vitamins and hormones, Oct. 26th to 31st; tuberculosis, Nov. 2nd to 7th; homœopathy, Oct. 12th to Nov. 6th. These courses have been arranged by the Berliner Akademie für ärztliche Fortbildung, and further information may be had from the secretary, Robert Koch-Platz, 7 Berlin, N.W.7.

The late Dr. John Donnan

The death occurred last week of Dr. John Donnan, of Dumfries, in a tragic manner. Riding on the sands at Monreith he fell from his horse into the sea. Rescued by onlookers he was removed to his lodgings and appeared at first to be none the worse from his accident. He died, however, presumably of heart failure, very shortly afterwards. Dr. Donnan was physician to the Dumfries and Galloway Royal Infirmary, saw service in Mesopotamia during the war, and was mentioned in dispatches, attaining the rank of major, R.A.M.C.

Medical Diary

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

SOCIETIES

PADDINGTON MEDICAL SOCIETY.

TUESDAY, Sept. 8th.—9 P.M. (Great Western Royal Hotel, Paddington), Dr. Maurice Marcus: Emotional Disturbance and Disease.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

BRITISH POSTGRADUATE MEDICAL SCHOOL, Ducane-road, W.

THURSDAY, Sept 10th.—2.15 P.M., gynæcological endocrinology.

FRIDAY.—2.15 P.M., Department of Gynæcology: Pathological demonstration.

Daily, 10 A.M. to 4 P.M., medical clinics, surgical clinics or operations, obstetrical and gynæcological clinics or operations.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.

MONDAY, Sept. 7th, to SATURDAY, Sept. 12th.—NATIONAL TEMPERANCE HOSPITAL, Hampstead-road, N.W. Tues. and Thurs., 8 P.M., clinical and pathological M.R.C.P. course.

Births, Marriages, and Deaths

BIRTHS

FOSS.—On August 22nd, at Clifton, the wife of Dr. George L. Foss, of a daughter.

GILMORE.—On August 24th, the wife of Dr. Reginald Gilmore, Chester, of a daughter.

GOUGH.—On August 26th, at Chichester, the wife of Dr. J. H. Harley Gough, of a son.

HODGE.—On August 30th, at Crewkerne, Somerset, the wife of Dr. R. Sessions Hodge, of a son.

LANKESTER.—On August 28th, at Hemingford, Guildford, the wife of Dr. Lionel Lankester, of a daughter.

SOUTHWARD.—On August 24th, at Skelmorlie, Ayrshire, the wife of Dr. Ralph Southward, of a son.

MARRIAGES

MIÉVILLE—PRIOR.—On August 27th, at the Parish Church of Hayes, Kent, George Christian Blake Miéville, M.R.C.S., to Ann, widow of Captain Frederick Prior, Royal Suffolk Regiment.

WALLACE—MOORE.—On August 24th, at St. George's, Hanover-square, W., William Herschel Scott Wallace, M.D., to Norah Danette Stott Moore, only daughter of Mr. Joseph Moore, Kingston Hill and Eastbourne.

DEATHS

BUTLER.—On August 22nd, Montagu Francis Butler, M.R.C.S. Eng., of Beckenham, aged 36.

CLITHEROW.—On August 29th, at Somerton, Herbert George Clitherow, M.R.C.S. Eng., aged 63.

COX.—On August 20th, at Bolberry Vean, Kingsbridge, Devon, Alfred Edward Cox, M.R.C.S. Eng., aged 75.

DEIGHAN.—On August 23rd, at West End-lane, Hampstead, William Joseph Deighan, M.B. N.U.I.

EDMUNDS.—On August 29th, abroad, Percy James Edmunds, M.B. Lond., B.Sc., late of Great Marlborough-street, London, W.

GRIGGS.—On August 28th, at Hove, William Alfred Griggs, M.R.C.S. Eng., aged 74.

HAMILTON.—On August 24th, at Bratton, Wilts, Archibald Douglas Hamilton, M.D. Lond.

LUNA.—On August 22nd, at Chorlton-cum-Hardy, Manchester, Victor Alfred Luna, M.R.C.S. Eng.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

BRIXHAM HOSPITAL.—Lady Goodson has opened a new wing to this institution, which has hitherto had to accommodate children in the same wards as adults. It includes private wards for paying patients.

Appointments

FIELDING, J., M.D. Leeds, D.P.H., has been appointed Assistant School Medical Officer and Assistant Medical Officer of Health for Coventry.

WATT, A., M.B. Sheff., Second Assistant Medical Officer at the Municipal General Hospital, Coventry.

Certifying Surgeons under the Factory and Workshop Acts: Dr. A. H. FORMAN (Buckhaven District, Fife); Dr. G. M. MACINTYRE (Lanchester District, Durham); Dr. J. B. DOBSON (Mold District, Flint); Dr. M. J. INGRAM (Langport District, Somerset); Dr. J. C. MCMASTER (Yeovil District, Somerset); Dr. J. G. WILLIAMS (Presteign District, Radnor).

Vacancies

For further information refer to the advertisement columns

Aberdeen Royal Infirmary.—Sen. Cas. O. and Res. Med. Reg., each £200.

Ashford, Kent, Grosvenor Sanatorium.—Res. H.P., at rate of £100.

Ashton-under-Lyne District Infirmary.—H.S., at rate of £150.

Barnstaple, North Devon Infirmary.—Res. M.O., at rate of £150.

Benenden, Kent, National Sanatorium.—Sen. and Jun. Asst. M.O.'s, at rate of £200 and £150 respectively.

Birmingham City.—Two Res. Asst. M.O.'s for Tuber. Section of P.H. Dept., each £400.

Birmingham, Dudley-road Hospital.—Jun. M.O., at rate of £200.

Birmingham Ear and Throat Hospital.—Second H.S., £150.

Birmingham, Romsley Hill Sanatorium.—Res. Asst. M.O., at rate of £240.

Bolingbroke Hospital, Wandsworth Common, S.W.—Res. M.O., £200.

Bolton, Townley's Hospital, Farnworth.—Asst. M.O., £225.

Bradford Royal Infirmary.—Two additional H.S.'s, each £150.

Brighton, New Sussex Hospital for Women.—H.S., at rate of £100.

Brighton, Royal Sussex County Hospital.—Hon. Surgeon, Physiotherapeutist, and Clin. Asst. to Dermatological Dept.

Brighton, Sussex Eye Hospital, Eastern-road.—H.S., at rate of £150.

British Postgraduate Medical School, Ducane-road, Shepherd's Bush, W.—First Asst. in Dept. of Med., £300–£400.

Burnley Victoria Hospital.—H.S., at rate of £150.

Burton-on-Trent, Bretby Hall Orthopædic Hospital.—Res. H.S., at rate of £200.

Cardiff, King Edward VII. Welsh National Memorial Association.—H.P. for Adelina Patti Tuberculosis Hospital, at rate of £150.

Central London Throat, Nose, and Ear Hospital, Gray's Inn-road, W.C.—Hon. Assts. in Out-patient Dept.

Charing Cross Hospital, W.C.—Hon. Clin. Asst. for X Ray Dept., &c.

Chester, East Lancashire Tuberculosis Colony, Barrowmore Hall.—H.P., at rate of £150.

Chester Royal Infirmary.—H.S., £150.

Chesterfield and North Derbyshire Royal Hospital.—H.S., at rate of £150.

City of London Maternity Hospital, City-road, E.C.—Jun. Res. M.O., at rate of £80.

Cobham, Surrey, Schiff Home of Recovery.—Resident, at rate of £200.

Colchester, Essex County Hospital.—Hon. Physician.

Coventry and Warwickshire Hospital.—H.S. for Aural and Ophth. Dept., at rate of £125.

Croydon County Borough.—Asst. M.O.H. and School M.O., £500.

Derbyshire Hospital for Sick Children.—Res. H.P., at rate of £130.

Eastbourne, Princess Alice Memorial Hospital.—Res. H.S., at rate of £150.

Elizabeth Garrett Anderson Hospital, Euston-road, N.W.—Hon. Asst. Surgeon to Throat, Nose, and Ear Dept. Asst. Radiologist, £100. Also third H.S., at rate of £50.

Exeter, Royal Devon and Exeter Hospital.—Res. Surg. O., £250. Also H.P. and H.S.'s, each at rate of £150.

Gloucestershire Royal Infirmary, &c.—Res. Surg. O., £200.

Grimsby and District Hospital.—Jun. H.S., £150.

Guildford, Royal Surrey County Hospital.—H.P. and H.S., each £150.

Halifax General Hospital.—Jun. Res. M.O., £250.

Hospital for Sick Children, Great Ormond-street, W.C.—Part-time Surg. Reg., £200. Half-time Out-patient Med. Reg., £175. Also Res. H.P. and Res. H.S., each at rate of £100.

Ilford, King George Hospital.—H.P. and H.S., each at rate of £100.

L.C.C.—Principal Asst. M.O. for Tuberculosis, £950. Part-time Obstetrician and Gynæcologist, £800. Temp. District M.O.'s, £135–£285. Also Med. Practitioners for sessional work in Antenatal Clinics, £1 11s. 6d. a session.

Leicester, City Mental Hospital, Humberstone.—Third Asst. Res. M.O., £350.

Liverpool Hahnemann Hospital.—Hon. Asst. Gynæcological Surg.

Liverpool Royal Children's Hospital, Myrtle-street.—Res. Cas. O., £250.

London Hospital, E.—Surgical First Asst. and Reg., £300. Also First Asst. and Reg. to Ear, Nose, and Throat Dept., £150.

London Lock Hospital, 283, Harrow-road, W.—Res. M.O. to Female Dept., at rate of £175.

Manchester, Ancoats Hospital.—H.S., at rate of £100. Also Clin. Asst., 10s. 6d. per Clinic.

Manchester, Booth Hall Hospital.—Jun. Asst. M.O., at rate of £200.

Manchester, Duchess of York Hospital for Babies.—Sen. Res. M.O., at rate of £125.

Manchester, Hulme Dispensary, Dale-street.—Res. M.O., £250.

Manchester, Royal Children's Hospital.—Two Asst. M.O.'s, each at rate of £150.

Manchester Royal Eye Hospital.—Jun. H.S., £120.

Manchester Royal Infirmary.—Med. Reg. to Out-patient Dept., also Res. Jun. M.O. for Barnes Convalescent Hospital, at rate of £150 and £100 respectively.

Manchester, St. Mary's Hospitals.—Four H.S.'s to Special Depts., each at rate of £50.

Marie Curie Hospital, Fitzjohn's-avenue, N.W.—Director of Medical Services and Research, £1000. Also Res. M.O., £100.

Miller General Hospital, Greenwich-road, S.E.—Hon. Phys. to Spec. Dept. for Children.

National Hospital for Diseases of the Nervous System, Queen-square, W.C.—Res. M.O., £200.

Newport, Mon., Royal Gwent Hospital.—Cas. O. and H.S., each at rate of £135.

New Zealand, Auckland Hospital.—Deputy Med. Supt.

Northampton General Hospital.—Two H.S.'s and Cas. O., each at rate of £150.

Norwich, Jenny Lind Hospital for Children.—Res. M.O., £120.

Plymouth City General Hospital.—Asst. M.O., £300.

Plymouth, Prince of Wales's Hospital.—H.S. for Lockyer street Hospital, at rate of £150.

Princess Elizabeth of York Hospital for Children, Shadwell, E.—H.P., at rate of £125.

Queen Charlotte's Maternity Hospital, Marylebone-road, N.W.—Res. Anæsthetist, at rate of £100. Res. Anæsthetist and District Res. M.O., at rate of £90. Also Asst. Res. M.O., at rate of £80.

Queen Mary's Hospital for the East End, Stratford, E.—Dermatologist.

Queen's Hospital for Children, Hackney-road, E.—H.P. and Cas. O., each at rate of £100.

Reading, Royal Berkshire Hospital.—Res. M.O. to Blagrave Branch Hospital, at rate of £125.

Rochdale Infirmary and Dispensary.—Second H.S. and H.P., each £150.

Royal Army Medical Corps.—Commissions.

Royal Cancer Hospital, Fulham-road, S.W.—H.S., at rate of £100.

Royal London Ophthalmic Hospital, City-road, E.C.—Sen. M.O., at rate of £150.

Royal National Orthopædic Hospital, 234, Gt. Portland-street, W.—Two H.S.'s, each at rate of £150.

Royal Northern Hospital, Holloway, N.—Med. Reg., £200. Also H.S., at rate of £70.

St. Peter's Hospital for Stone, &c., Henrietta-street, Covent Garden, W.C.—H.S., at rate of £75.

Salford Royal Hospital.—H.P., two H.S.'s, and Cas. H.S., each at rate of £125.

Samaritan Free Hospital for Women, Marylebone-road, N.W.—H.S., at rate of £100.

Sheffield City.—M.O., £750.

Sheffield Royal Hospital.—Cas. O., £150.

South Eastern Hospital for Children, Sydenham, S.E.—Res. M.O., at rate of £100.

Southend-on-Sea General Hospital.—H.P., Res. Obstet. O., two H.S.'s, each at rate of £100. Also Cas. O., £125.

Southern Rhodesia Government.—Medical Inspector of Schools, £800.

Stoke-on-Trent, North Staffordshire Royal Infirmary.—H.S., at rate of £150.

Sudan Medical Service.—Two Medical Officers, each £E.720.

Sudan Medical Service, Stack Medical Research Laboratories.—Bacteriologist, £E.720.

Taunton and Somerset Hospital.—H.P., at rate of £100.

Walsall General Hospital.—Hon. Physician to Skin Dept. Also Res. Surg. O., £300.

Warrington Infirmary and Dispensary.—Third Resident, at rate of £150.

Warwick, King Edward VII. Memorial Sanatorium, Hertford Hill.—Jun. Asst. M.O., at rate of £250.

West Bromwich and District General Hospital.—Cas. O., at rate of £200.

West London Hospital, Hammersmith-road, W.—Res. Asst. Surg., £200. Also H.P. and H.S., each at rate of £100.

Western Ophthalmic Hospital, Marylebone-road, N.W.—Sen. and Jun. Res. H.S.'s, at rate of £150 and £90 respectively.

Willesden Corporation.—Asst. M.O., £600.

Willesden General Hospital, Harlesden-road, N.W.—Hon. Dental Surgeon. Cas. O., at rate of £100. Also Asst. M.O., £50.

Worthing Hospital.—H.S., at rate of £130.

Worthing Hospital Maternity Home.—Obstetrician, 100 guineas.

Wrexham and East Denbighshire War Memorial Hospital.—Two Res. H.S.'s, each at rate of £150.

York City Education Committee.—Sen. Asst. School M.O., £500.

EMIGRATION OF GERMAN JEWISH DOCTORS.—According to *Industrial and Labour Information* (August 17th), the number of Jewish medical men and women who have lost the right to practise in Germany is estimated at about 4000, of whom 1800 have already emigrated. Of these 650 went to Palestine, 400 to the United States, 300 to Great Britain, 80 to the Soviet Union, 75 to France, 70 to Italy, 100 to other European countries, and 100 to countries in Asia and Africa. "Owing to legislative restrictions," it is stated, "some of them are in extremely difficult circumstances."

NOTES, COMMENTS, AND ABSTRACTS

MEDICAL AND VETERINARY COLLABORATION

IN the course of an address to the North-West London Medical Society, Sir Frederick Hobday, principal and dean of the Royal Veterinary College, drew attention to some points of interest to human medicine from analogies in animals. We are, he said, both branches of one tree and we can do much in common to help one another. The analogies and differences between the diseases of our mutual patients give much food for thought. You of the medical profession have your differences of temperament, sex, age, climate, and numbers of other things to consider, and we, too, have these, but in addition our patients include many more varieties of species than yours and we are able to consider them from a much greater variety of aspects.

Clinical Comparisons

Take, for instance only, the questions of food and drink. Amongst our patients we have no alcoholics, and yet we get as high a proportion of cases of cirrhosis of the liver in old age as you do. As a student I was led to understand that this condition was the attribute of the heavy drinker, and in animals such indulgence is unknown. Some of our patients are entirely carnivorous, others herbivorous only, and a third category are omnivorous. Various theories have from time to time associated cancer with dietetic causes; but the disease occurs alike in herbivorous and carnivorous feeders, and even in fish.

As with your patients, some of our animals are very temperamental, either nervous and excitable, or unduly phlegmatic; some animals are brilliant in brain power, others are dull and stupid. We have, too, our cretins, and those which show symptoms similar to insanity in man. Some it seems impossible to teach anything; with others a few lessons are sufficient to make an efficient training.

The diseases of birds, and fish too, come under the ægis of the veterinarian, and the tumours and diseases of the parrot, the domesticated fowl, the salmon, and the trout have given much food for thought and useful comparison with the tumours of man. The fact that cancer existed in the fish tribe was first demonstrated by a veterinary pathologist, Prof. Gilruth of New Zealand.

DRUGS

In veterinary practice we use the same drugs as you do, but apart from the great range of dosage the therapeutic action of a pharmaceutical preparation may vary from species to species. Morphia, for example, acts as a deliriant when administered to the horse and the cat, whereas to the dog and the pig it is as useful a narcotic as it is to man. The amount which can be taken without producing toxic effects in the dog is extraordinary; I am unable to tell you how much would poison even an average-sized terrier. Strychnine, on the other hand, has to be used with the greatest caution, particularly for the dog and the cow; the veterinary surgeon prefers to have the dog under his eye whilst it is being used.

Comparative Pathology

The solution of the question why certain species of animals possess immunity to certain diseases would be a very important point in the fight against disease. Why, for example, should the ox be insusceptible to glanders—a disease to which man and all the members of the horse tribe readily succumb? There must be some reason, some law of nature, the clue to which may be found by collaboration between the two branches of scientific medicine.

One of our keenest observers, the late Mr. William Hunting, F.R.C.V.S., is responsible for the following reminder.

"Careful observation makes a skilful practitioner but his skill dies with him. By recording his observations he adds to the knowledge of his profession and assists by his facts in building up the solid edifice of pathological science."

This quotation is one which the clinician should carefully ponder over, for the waste of pathological material which goes on every year is appalling. This applies even more to veterinary than human practice, for in the majority of instances we are able to get a post-mortem made by which we can discover our mistakes.

The first essential of the student is to know something about his patients in a state of health as otherwise he cannot possibly have as good an acquaintance with them when diseased. Errors in dietetics bring on diseased conditions as surely in animals as in man, and in this respect we have the advantage of a much greater control, as animals can only eat what is set before them and are not able to pick and choose their luxuries at will. Like you, we have our greedy patients, and digestive ailments are numerous and varied. Gastritis, indigestion, colic, internal parasites, colitis, the swallowing of foreign bodies, intussusception, ulcerative conditions of the bowels, are all common animal ailments and our treatments are carried out on much the same principles as are those of similar conditions in man. But we have always to recollect the anatomical variations of the organs of digestion, as some of our patients, such as the horse, dog, pig, and cat, possess one stomach only—and that a small one—whilst the ox and sheep have four and the camel three.

Elimination of Disease Common to Man and Animals

Where we can help one another more particularly is in the eradication of some of the great scourges of the day, in the formation of a scheme of preventive as well as curative medicine; and this especially applies in those diseases from which animals suffer equally with man. With diseases which cannot appear in man except through the agency of the animal the veterinary profession stands alone in the front trench. Once they are stamped out in animals or animal products they automatically cease to exist in mankind.

GLANDERS AND RABIES

Medical practitioners in England to-day have to thank the veterinary department of the Ministry of Agriculture for the freedom of their human patients from two horrible diseases. Twenty-five years ago glanders existed to such an extent in certain of our large cities that an average of over 2000 horses were destroyed each year for this disease alone, the stables in which they existed being a continual source of danger to the men employed around them. The last case of glanders in this country was reported in 1923. For this eradication we are indebted to the intelligent use of mallein, an agent which we use as a test for the presence of glanders in the system of a horse, but which I understand is too drastic in its effects on man to be administered except under expert supervision. By its aid the horses and mules of the allied armies during the great European war were kept free from a disease which had been rampant in former campaigns. The attendant on a glandered horse was always taking risks; once contracted the disease was practically always fatal. The difficulty of diagnosis is great. On several occasions I have been officially present at the post-mortem examinations of glanders in man, and I recollect that in one case the diagnosis had been chronic pleurisy and in another chronic rheumatism, glanders only being suspected towards the end.

Of rabies we can give even a better account, for this disease can be said to have been extinct in this country for many years, and the student of to-day

who has never been abroad has to rely entirely on text-book descriptions. In continental countries, by reason of their land frontiers, rabies is difficult to get rid of; and, with the exception of Norway, Sweden, and Denmark, it is still rife amongst dogs. Not only domesticated animals are susceptible, but also wild ones and even fowls.

ANTHRAX

If the animal products question was ruled out, anthrax would be another instance of those diseases which would not be seen by the human practitioner for diagnosis or treatment, and the necessities for stricter measures in dealing with it have been repeatedly brought forward for earnest consideration. At the International Labour Congress, held in Geneva in 1921, an international committee was appointed to consider the disinfection of wool and hair infected with anthrax, the methods of preventing infection amongst flocks, and the possibilities of dealing with infection from hides, skins, and other material. The Liverpool experimental disinfection station has thoroughly justified the cost of its establishment, and deaths from wool-sorters' disease have been reduced by more than half since the compulsory disinfection of animal products admitted to Great Britain from countries where anthrax is prevalent.

The veterinary practitioner sees the disease most commonly in cattle, although it may be met with in the horse, sheep, pig, and even the dog, the latter animal being less susceptible than the others. Sclavo's serum, the sheet-anchor in the human treatment, is useless for the animal, and both in horses and cattle this disease still holds its own as one of the most rapidly fatal of all microbial diseases. Bone manure, foreign cake, and other feeding stuffs, obtained from countries where anthrax is rife and improperly controlled, are blamed largely for its appearance amongst stock. It is a troublesome disease and difficult to control, but the precautions of the Ministry of Agriculture have substantially reduced the number of outbreaks in animals.

TUBERCULOSIS

The cow with the tuberculous udder can now be dealt with and it is this animal which is the source of so much danger to children and others who drink milk. Tuberculosis is pre-eminently a disease in which the clinicians of human and veterinary medicine must work together; the human physician to protect his patient from drinking tuberculous milk, and the veterinarian to detect the animal supplying it. To pasteurise or sterilise the milk is not nearly so good a method as to attack the disease at its source, and its source is the cow—an undertaking in which the astute veterinary clinician finds room for his abilities and is able to render valuable assistance to the State and to the community by collaboration with his medical confrère. The general health and condition too of tubercle-free animals is far better than that of the infected ones.

CANCER

Cancer occurs as much in animals as in man. It is seen as much in the country as in the town. It is practically always a disease of middle or advanced life, and is, therefore, most commonly met with in animals which are kept for work, such as the horse, or for companionship, such as the dog and cat. In the animals kept for food its existence is almost negligible. Of interest is the disparity of mammary cancer in various species of animals; rare in the cow and mare, it is by no means uncommon in the bitch and cat. Cancer is well recognised as occurring in the testicles of all animals; it is not of common occurrence in the ovaries. The demodex parasite, repeatedly found [1] in or around the teats of the breasts of women who had got cancer, is of interest to us in veterinary practice, as these parasites exist by the thousand at times in the skin of the young dog when affected with follicular mange, and cancer of the skin is never seen in connexion with it.

The situations in which epithelioma is found in animals are much the same as in man, the penis, frontal sinuses, the caruncula lacrymalis, and the lips of the vulva being favourite situations in the horse or mare; the orbit in the cow; and the pharynx, œsophagus, larynx, mammary gland, and testicles in the dog and cat. Although not common, cancer is also found in the bowel and rectum, less frequently in the bladder and kidney; in the liver it is not uncommon. In the generative organs, cancer is more commonly seen in the male than the female, the testes frequently becoming carcinomatous; cancer of the stomach is not common either in male or female.

Sir Frederick Hobday concluded his address with the remark that in coöperation between the two branches of medicine lay the solution of many of the problems of disease with which at the present time both men and animals are affected.

[1] THE LANCET, 1925, i., 172.

"HELP SOUGHT"

UNDER this heading in THE LANCET of August 22nd a medical man who desired to remain anonymous asked for advice as to treatment in a case of giant urticaria, the patient being his wife. The following letters have been received:—

Dr. E. C. WARNER writes: "I have had a number of successes with glucose in fairly large doses, using one ounce t.d.s. for two to three days and then decreasing as the urticaria subsides so that later it need only be taken in the form of one ounce of glucose at the commencement of subsequent attacks. This simple remedy seems to succeed when many other lines of treatment have failed."

Dr. C. T. NORRIS writes: "I have found in cases similar but not so severe, that local application of lotio calaminæ to the weals, and the following mixture taken by mouth, is associated in a few days with cessation of the complaint.

℞ Sodii bicarb. grs. xxx.
Inf. rhei conc. B.P.C. ♏ xxx.
Sp. ammon. aromat. ♏ x.
Aq. ad ʒss.
Sig. One tablespoonful in water every four hours.

"In the case described I should personally be inclined to give the mixture two-hourly for the first few doses. I tell patients they need not fear a certain amount of purging. This therapy is not rational but is based on the general idea that the cause of the urticaria is some toxæmic absorption from the bowel, and that stimulation and gradual clearing of the gut removes the danger of further absorption, allowing the body to deal with that already present. I do not think the case described differs from those I have seen except in intensity; nor is the patient interested in whether the condition is toxæmic or allergic. I can only say this treatment, right or wrong, seems to answer."

FESTSCHRIFT FOR DR. EMIL BARELL

IT is now 40 years since Emil Christoph Barell, a recent graduate at the University of Zurich in philosophy and medicine, entered the service of F. Hoffmann-La Roche and Co. as chief chemist. From quite small beginnings he has brought into being a world-wide organisation and he is now managing director of the Swiss firm and president of 17 associated companies. Dr. Barell's friends and colleagues have done him the honour of publishing a souvenir volume in the form of original contributions covering a wide field of pharmacology. The contributors include the directors of institutes in Basle, Zurich, Munich, and Berlin; there are a score or more of short monographs from members of the Roche staff in Basle, Nutley, N.J., and Berlin; Prof. G. Barger, F.R.S., of Edinburgh, opens with an historical note

entitled "From Physostigmine to Prostigmin," and Dr. M. Fishbein, editor of the *Journal of the American Medical Association*, in a foreword points out how in many instances the first step made by an investigator in laboratory or clinic has meant little to the world at large, and how the determining factor in success has been the extension of this discovery by the development of technique and apparatus to provide material for clinical research. Dr. Fishbein congratulates Dr. Barell on the type of scientific research carried on in the investigative laboratories for which he is responsible, adding "a significant factor in scientific medicine is the standardisation of materials."

HOLIDAYS FOR WORKING WOMEN

THE following letter reaches us from the Factory Girls' Country Holiday Fund: "Will you allow us to make a very urgent appeal to your readers for this fund? Throughout the year the poorest working women and girls are sent away, but the majority are compelled to take their short holiday, usually a week, sometimes only a week-end, in July, August, and September. Many are mere children of 14 and 15. Most of them save up small sums weekly for months before, but they cannot contribute much towards the cost as the majority are helping to keep younger brothers and sisters. The committee are hard pressed for funds to meet the heavy demands made on them at the holiday season. Hundreds of women and girls are hoping to go away now, and only those who live and work among them can realise what a bitter disappointment it will be if we have to refuse to send any of them for lack of funds. Their home conditions are far from good, and they live and work in the most crowded and airless districts of our great city. We feel sure that the generous public will come to their aid, and enable us to provide the change and rest they so sorely need. Gifts will be thankfully received and acknowledged by the hon. treasurer, Mrs. Slater, or by Miss Mary Canney, M.B.E., 75, Lamb's Conduit-street, London, W.C.1."

The appeal is signed by the Duchess of Norfolk, the Countess of Sandwich, the Bishop of London, the Chief Rabbi, and Lady Loch (chairman).

A MEDICAL SURVEY IN PAPUA

LAST year, at the invitation of the Papuan administration, a medical expedition from the school of public health and tropical medicine of Sydney University carried out a village-to-village survey of a specified area in the western portion of the central division of Papua (Med. Jour. Australia, 1936, i., 451). The object of the expedition was to collect facts about the health and disease of these virile tribes living in a well-populated area for comparison with a similar survey of the depopulated areas of eastern Papua. Among the indigenous diseases, yaws was proved to be the most important. Introduced probably from Polynesia by traders a hundred years ago, it has spread through all the coastal tribes but has made little progress inland. Of about 3500 natives belonging to the coastal and subcoastal population 12 per cent. were found to be suffering from active yaws, 76 per cent. of these being in the secondary stage. At regular intervals native medical assistants visit the Mekeo and Roro tribes and treat all cases of yaws with a single intragluteal injection of bismuth salicylate. Secondary yaws preponderated among the children, and among inadequately treated adults all the various tertiary lesions were encountered. Tropical ulcer was rare, less than 1 per cent. of the population being affected and almost all the cases being seen in young children. Tinea, much less important but commoner than yaws, occurred as tinea flava and tinea imbricata. A definite hereditary predisposition to the latter is widespread throughout the coastal tribes, but girls who are grossly infected with the disease are no less valuable in the marriage market on this account. The disease is rare among the mountain tribes but, when it occurs, produces a reaction more severe than that observed on the coast. The subcoastal natives are full of malaria and all the children have enlarged spleens; in every case examined the parasite was *Plasmodium falciparum*. The tribe, however, is increasing in numbers and seems to be relatively unaffected by the disease. Thanks to the coprophagous habits of the local pigs, hookworm does not occur, but filariasis is common though it rarely gives rise to symptoms. In one village only two cases of elephantiasis were seen although microfilariæ were demonstrated in the blood of all the inhabitants over 45.

So much for the indigenous diseases. Of those recently introduced, seven cases of chronic leprosy were found, but there was a remarkable absence of gonorrhœa; only one woman showed eye signs attributable to ophthalmia neonatorum. Several cases of infantile paralysis were seen, following an epidemic in 1929. Many other diseases common to white races also occur, including paralysis agitans, probably post-encephalitic, rheumatic carditis, and myasthenia gravis. Bronchitis is common but tuberculosis was not found. In most of the villages studied the birth-rate exceeds the death-rate, but maternal mortality, owing to primitive midwifery, is high. Abortion is not common among these tribes since children are a financial asset, but it is practised to some extent. Mekeo women were at one time prone to miscarry. To prevent this brides are excused all manual labour and fed upon the fat of the land till after the birth of the first baby.

NEW PREPARATIONS

TANNA-FLAVINE JELLY is a non-oily preparation of tannic acid and Acriflavine B.D., the latter being manufactured by Imperial Chemical Industries. It is intended for the treatment of minor burns and for the first-aid treatment of severe burns. If oil of any kind has previously been used it must be cleansed away before Tanna-flavine jelly is applied; likewise all blistered, loose, and devitalised tissue should be cut off. The jelly is spread thinly over the injured area and if possible allowed to dry before being covered with a bandage. In the further treatment of severe burns the Tanna-flavine jelly is removed with normal saline, after which other tannic acid preparations, such as Tanna-flavine solution, can be applied. The jelly is prepared for medical use and sold by the British Drug Houses Ltd. (Graham-street, London, N.1).

DMELCOS DIAGNOSTIC VACCINE, containing 450 million *B. ulceris cancrosi* (Ducrey's bacillus) in 1·0 c.cm. of physiological saline, is used for the Reenstierna intracutaneous test in doubtful cases of soft chancre and also for the treatment of this condition. It is supplied by Pharmaceutical Specialities (May and Baker) Ltd., Dagenham, in ampoules of 0·25 c.cm.

VERACOLATE.—William R. Warner and Co., Ltd. (300, Gray's Inn-road, W.C.1), produce a "cholagogue evacuant" in the form of Veracolate Brand Tablets, made for them in the United States. Each of these is said to contain sodium glycocholate 0·40 grain, sodium taurocholate 0·67 grain, extract of cascara sagrada 1·0 grain, phenolphthalein 0·5 grain, and oleoresin of capsicum 0·05 grain, and the initial dose proposed is one to three tablets at bedtime, or one after each meal, administration being continued if necessary over long periods. An increased flow of healthy bile may, it is suggested, lead to dissolution of gall-stones, and the relief of catarrhal conditions in the bile-ducts and gall-bladder; but if bile-salts are given without a laxative they may do no more than increase the absorption of food fats. Messrs. Warner consider Veracolate suitable in cases of biliary stasis, functional hepatic insufficiency, intestinal fermentation, "and in biliary disorders generally." Its action is said to be gentle yet effective.

VIGOREAT CRISPBREAD, imported by J. R. Coffey and Co., Ltd. (14, South Wharf, London, W.2), is made from whole-grain rye and is recommended for patients suffering from constipation. While claiming that the crispbread has 50 per cent. more nutritive value than ordinary wheaten bread the manufacturers state that it is non-fattening.